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April 1988

Atlas and Zoogeography of Common Fishes in the Bering Sea and Northeastern Pacific

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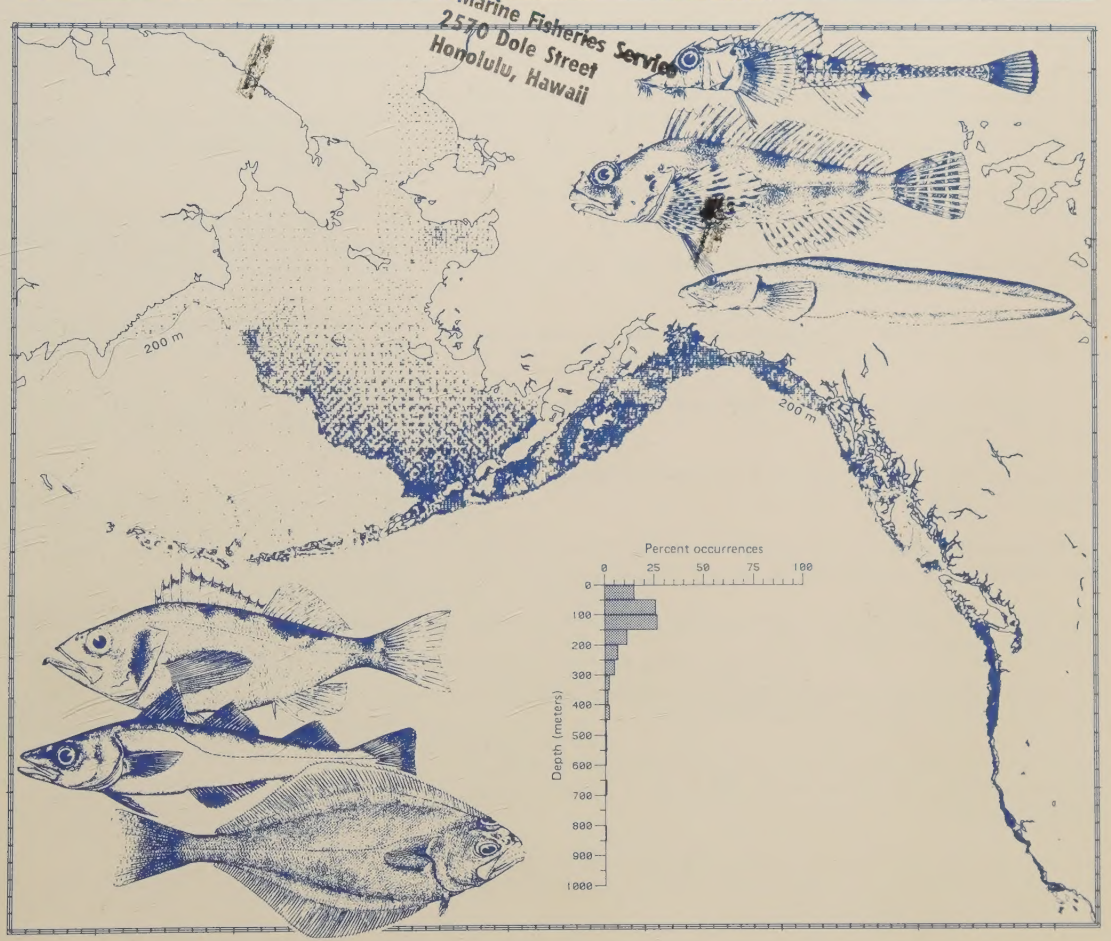

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Atlas and Zoogeography of Common Fishes in the Bering Sea and Northeastern Pacific

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ABSTRACT

The geographic and depth frequency distribution of 124 common demersal fish species in the northeastern Pacific were plotted from data on file at the Northwest and Alaska Fisheries Center (NWAFC), National Marine Fisheries Service. The data included catch records of fishes and invertebrates from 24,881 samples taken from the Chukchi Sea, throughout the Bering Sea, Aleutian Basin, Aleutian Archipelago, and the Gulf of Alaska, and from southeastern Alaska south to southern California. Samples were collected by a number of agencies and institutions over a 30-year period (1953-83), but were primarily from NWAFC demersal trawls. The distributions of all species with 100 or more occurrences in the data set were plotted by computer.

Distributions plotted from these data were then compared with geographic and depth-range limits given in the literature. These data provide new range extensions (geographic, depth, or both) for 114 species. Questionable extensions are noted, the depth ranges determined for 95% of occurrences, and depths of most frequent occurrence are recorded.

Ranges of the species were classified zoogeographically, according to life zone, and with regard to the depth zone of greatest occurrence. Because most species examined have broad geographic ranges, they do not provide the best information for testing the validity of proposed zoogeographic province boundaries. Because of the location of greatest sampling effort and methods used in sampling, most fishes examined were eastern boreal Pacific, sublittoral-bathyal (outer shelf) species.

INTRODUCTION

The coastal region of the northeastern Pacific and Bering Sea can be divided into a number of zoogeographic provinces, each of which contains a relatively distinctive fauna (Briggs 1974). Each zoogeographic region represents a particular set of environmental conditions, and includes species that have lived together during their recent evolutionary history. Zoogeographic studies of marine fishes are typically based on distributional records of the species from museum collections or from the literature. However, because of the relatively small numbers of records available from these sources, the geographic distribution of the fishes is sketchily defined and undue importance is often placed on records from the edges of the species' ranges. Because individuals taken at the extreme edge of a range may be strays or may represent a transiently established population in an atypically occupied region, zoogeographic patterns are often unclearly defined.

During the past 20 years a number of foreign and domestic agencies have conducted research surveys (mostly using bottom trawls) in the northeastern Pacific and Bering Sea to assess the status of fish stocks in these regions. Data on the species composition of about 25,000 samples are at present in computer files at the Northwest and Alaska Fisheries Center (NWAFC), National Marine Fisheries Service (NMFS), described by Mintel and Smith (1981). Because of recently developed computer-mapping techniques, the distribution of individual species occurring in these surveys can easily be plotted for the whole northeastern Pacific and Bering Sea. These distributional plots provide a better description of the overall distribution of each species within these regions than is generally available for most zoogeographic studies. This is because regions of rare occurrence near the edges of ranges can be distinguished from regions of common occurrence. The objectives of this study are to provide an atlas of the overall distribution pattern (including both depth and geographic distribution) of the most common fish species in the northeastern Pacific and Bering Sea, and to classify these species with regard to their distributional patterns (zoogeographic, life zone, and bathymetric).

METHODS

Data sources and characteristics

This study is based on information available in the computer database system developed at the NWAFC for storing and using fisheries survey information (Mintel and Smith 1981). The database includes results from approximately 32 years of resource survey investigations by the NMFS (and its predecessor agencies) in the Pacific Northwest and Alaska regions. Most of these data were collected in large-scale, bottom-trawl surveys conducted by the NWAFC's Resource Assessment and Conservation Engineering (RACE) Division. In addition, the database contains extensive collections of fisheries survey data from other sources, including the following: 1) surveys using other sampling methods, such as midwater trawls and fish traps; 2) published and unpublished cruise results from the International Pacific Halibut Commission, Alaska Department of Fish and Game, Far Seas Fisheries Research Laboratory (Shimizu, Japan), Fisheries Research Board of Canada, and Oregon Department of Fish and Wildlife; and 3) fisheries survey data from cooperative foreign research cruises with Japan, Poland, the U.S.S.R., Canada, and Republic of Korea.

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The data from most of the resource surveys represented in the database (and particularly surveys conducted by the RACE Division) were collected by relatively standard procedures (see Dark et al. 1980; Gunderson and Sample 1980; Parks and Hughes 1981; and Smith and Bakkala 1982 for representative examples). Sampling stations were located within a study area in a prearranged pattern, usually a systematic grid. At each station a trawl net was towed, or a fish trap was set, for a standard duration. Fish and invertebrates recovered in the sample were identified to the lowest reliable taxonomic level, weighed, and counted. Taxonomic identifications of fishes have generally been made by fishery biologists using the best available field guides and keys, but also by specialists with particular expertise in fish systematics. The principal literature used to identify fishes in the various regions has been Wilimovsky (1958), Hitz (1981), Miller and Lea (1972), Hart (1973), and Eschmeyer and Herald (1983).

In surveys conducted by the RACE Division, all standard data were edited and filed with all previous results in the NWAFC's computer database at the end of each cruise leg.

Database retrievals and analyses

The data resources in the NWAFC system are organized into three geographic databases: Bering Sea and Aleutian Islands, Gulf of Alaska, and Pacific Coast (Mintel and Smith 1981). The database for each area has five primary files that include the basic survey data. Two of them, haul and catch files, were used for this study.

Haul file data describe the characteristics of each sampling site. At the time of this study, the haul file contained 24,881 records, distributed as follows: Bering Sea and Aleutian Islands 10,697; Gulf of Alaska 10,806; and Pacific Coast 3,378. Catch file data describe the catch information from each survey sample and include a 5-digit species code, weight, and number. There is one record per taxon and usually multiple catch records per haul. The catch file includes more than 330,000 records.

In this study, catch data for a particular fish species were first retrieved from each regional database, then associated with the corresponding haul data, and finally mapped and summarized statistically. The geographic distribution of a species was plotted using three computer programs: STATION; UNDER/PLOT; and MAP (Mintel and Smith 1981). Program STATION was used to select data from the haul file for plotting. Because some species occurred in numerous samples, it was necessary to control overplotting of stations by using program UNDER/PLOT to subdivide all maps into a grid of statistical blocks about the size of a plot symbol, 5′ latitude by 5′ longitude, and representing all occurrences of stations within a block by a single "+" character. Program MAP was then used to draw an actual map and include 200-m depth contours. The distribution of a species, or a set of stations, with respect to sampling depths was summarized using the FREQUENCIES procedure available in the SPSS statistical package (Nie et al. 1975). This method calculated the total number of occurrences in each 50-m interval of the depth range, e.g., 0-49 m, 50-99 m, 100-149 m.

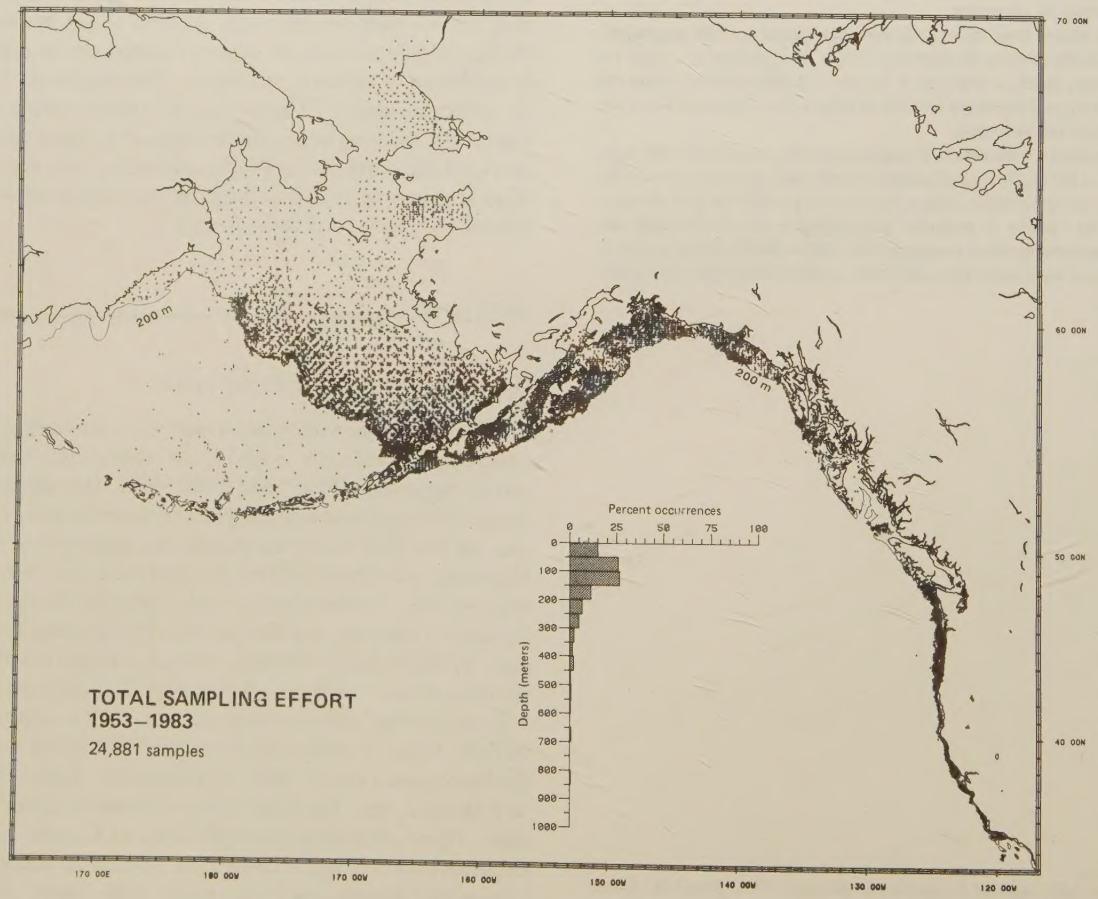


Figure 1
Distribution of the total sampling effort.

Survey coverage and limitations

The total sampling effort (i.e., 24,881 trawl and fish trap samples) represented in the database was distributed over an extensive geographic area (Fig. 1). Data were available for the continental shelf and slope of western North America and northeastern Asia from north of Cape Lisburne (lat. 68°53′N) in the Chukchi Sea, south throughout the Bering Sea (including the continental shelf of northeast Siberia north of Cape Olyutorski, U.S.S.R.), the Aleutian Basin and eastward from the Commander Islands along the Aleutian Islands, and along the U.S. Pacific coast from the Gulf of Alaska to San Clemente Island, California (ca. lat. 33°N, long. 118°30′W). Geographic distribution of the data was not even; 86.4% of the haul data had been collected off Alaska and only 13.6% were taken off California, Oregon, Washington, and western Canada.

Similarly, although the sampling coverage extended to deeper than 1,200 m, it was biased toward continental shelf depths because most of the surveys were conducted to assess continental shelf resources important to commercial fisheries. A total of 77.9% of the 24,881 survey samples had been taken at depths shallower than 200 m, mostly over continental shelf areas (see Figure 1, Table 1). This intensive sampling effort on the shelf was a potential source of bias and distortion in the summaries of vertical distribution patterns. In addition, few samples were taken at depths less than 30 m; hence, the importance of some species in the intertidal and shallow subtidal zones may not be apparent.

The database contained some misidentifications and errors. Sometimes these appeared in maps as isolated points representing either incidental misidentifications or errors in data codes. In other cases, several fish species were probably consistently misidentified over large areas for several years. These problems are discussed in the text describing the distribution of each species.

Most of the survey data were collected using commercial fishing gear with large mesh sizes. Principal sampling gears included the 400-mesh Eastern trawl, 81/112 Eastern trawl, 61-foot shrimp trawl, Nor'Eastern otter trawl, and similar nets (Wathne 1977; Gunderson and Sample 1980) These were generally inefficient for capturing small fishes.

Descriptions of depth distributions are based on reported "sampling depth" information. The sampling depth recorded was generally the maximum depth at which a trawl net was towed to collect a sample. However, since open mouth nets were used, all of the trawl samples must be considered to have been oblique net tows that may have collected organisms at any depth along the tow path. As a result, some fishes (pelagic fishes, especially) may have been recorded at greater depths than they actually occurred. In addition, the efficiencies of the various sampling gears probably varied with depth.

The geographic distribution pattern of each species included in this study is based on the presence or absence of the species in a 5×5 minute block and, hence, does not show either frequency of occurrence in that block or abundance.

Table 1

Frequency distribution of the total sampling effort vs. depth for data collected from the Chukchi Sea and Bering Sea to southern California.

Depth interval (m)	Frequency[1]	Percent frequency	Cumulative percent
0 - 49	3,823	15.4	15.4
50 - 99	5,997	24.1	39.5
100 - 149	6,532	26.3	65.8
150 - 199	3,030	12.2	78.0
200 - 249	1,678	6.7	84.7
250 - 299	1,260	5.1	89.8
300 - 349	604	2.4	92.2
350 - 399	373	1.5	93.7
400 - 449	489	2.0	95.7
450 - 499	167	0.7	96.4
500 - 549	173	0.7	97.1
550 - 599	134	0.5	97.6
600 - 649	77	0.3	97.9
650 - 699	160	0.6	98.5
700 - 749	70	0.3	98.8
750 - 799	63	0.3	99.1
800 - 849	146	0.6	99.7
850 - 899	32	0.1	99.8
900 - 949	12	<0.1	99.8
950 - 999	13	<0.1	99.8
1,000 - 1,049	13	<0.1	99.9
1,050 - 1,099	1	<0.1	99.9
1,100 - 1,149	0	0.0	99.9
1,150 - 1,199	0	0.0	99.9
≥1,200	34	0.1	100.0
Total	24,881	100.0	100.0

[1]Number of trawl and fish trap samples.

Extensions of known ranges

The geographic and depth ranges found in the survey data were then compared with ranges found in the literature for each species. Major references for this information included Andriyashev (1954), Wilimovsky (1964), Miller and Lea (1972), Quast and Hall (1972), Fedorov (1973a), Hart (1973), Howe (1981), and Eschmeyer and Herald (1983). Other sources were cited if they provided range limits not given in the general references or more specific locations. No attempt was made to track down original citations for range limits found in the more general literature. Some of these are cited in Andriyashev (1954), Quast and Hall (1972), and Hart (1973).

Extensions of known ranges were then evaluated for potential validity. Questionable extensions were annotated as follows: 1) additional specific information may occur in the literature, 2) the extension may represent a misidentification, 3) a maximum depth extension may not be representative, or 4) the extension is anomalous in occurring far outside the known range of the species.

Distributional classification schemes

Zoogeographic classification scheme

Zoogeographic classification schemes group geographic areas with different faunas into zones, regions, and provinces. These faunal groups generally occur in different latitudinal (or climatic) zones and on different continents (or other definable geographic areas). Ekman (1953), Hedgpeth (1957b), and Briggs (1974) summarized the literature on zoogeographic patterns of coastal marine fishes and invertebrates and defined coastal zoogeographic zones for the world. Briggs (1974) divided major latitudinal climatic zones into regions (usually on different continents) and further divided these into provinces, each of which include 10% or more endemic species. Hubbs (1974) and Peden and Wilson (1976) have criticized this study with regard to the location of provincial boundaries in the northeastern Pacific. The zoogeographic patterns of fishes in the North Pacific and Bering Sea have been described by Andriyashev (1939),

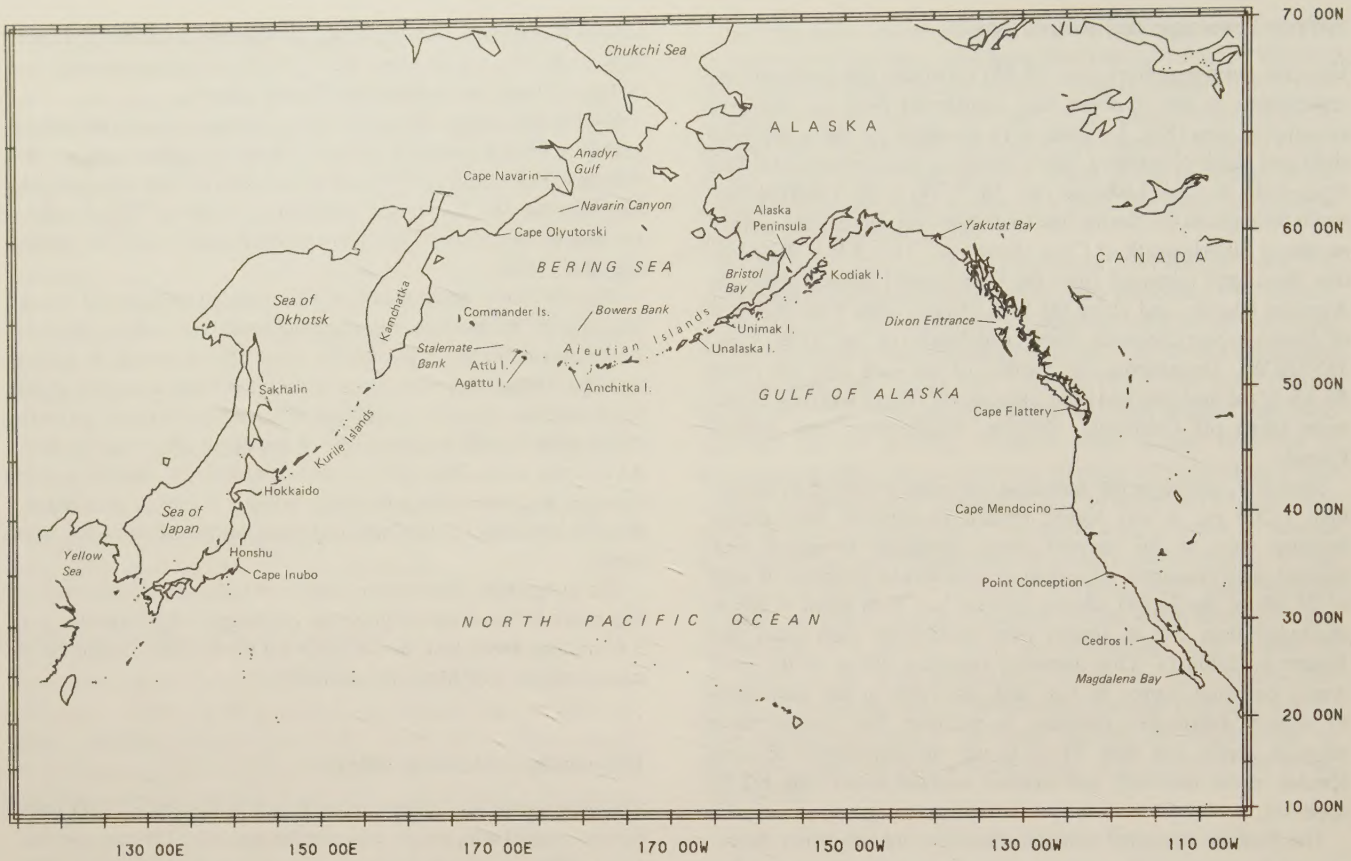


Figure 2
Important geographic locations mentioned in text.

Shmidt (1950), Quast (1968), and Horn and Allen (1978). McGowan (1971) defined zoogeographic zones in the oceanic North Pacific based primarily on the distribution of zooplankton species. It should be noted that abyssal zoogeographic regions are different from those found in surface waters (Menzies et al. 1973).

The zoogeographic classification scheme used in this study for describing the geographic ranges of fish species is based primarily on the schemes proposed by McGowan (1971) and Briggs (1974) (Figure 2, 3; Table 2). Regions and provinces pertinent to distributions of common fishes in the Bering Sea include the following: 1) Arctic Region; 2) Eastern Boreal Pacific Region (including the Aleutian and Oregonian Provinces); 3) Western Boreal Pacific Region (including the Kurile, Okhotsk, and Oriental Provinces); 4) Oceanic Boreal Pacific Region (including the Subarctic Province and Transition Zone); 5) California Region (including the San Diego and Cortez Provinces); 6) Japan Region; 7) Western Boreal Atlantic Region; 8) Eastern Boreal Atlantic Region; 9) Carolina Region; and 10) Mediterranean-Atlantic Region (Lusitania Province only).

Zoogeographic classification of species geographic ranges

The geographic range of each species usually extends over more than one zoogeographic province. Hence, the range of each species can be described in terms of the zoogeographic provinces through which it extends. Where one or two provinces are spanned by the range, the terms given here will be those of the provinces. Terms that require further definition include the following:

amphiboreal—occurring in both Atlantic and Pacific boreal regions.

circumboreal—occurring throughout the coastal boreal regions of an ocean. In the North Atlantic this includes both the Western Boreal Atlantic and Eastern Boreal Atlantic Regions. In the North Pacific this includes Oriental, Kurile, Okhotsk, Aleutian, and Oregonian Provinces.

northeastern boreal Pacific—includes Kurile, Okhotsk, Aleutian, and Oregonian Provinces, but not the Oriental Province.

northwestern boreal Pacific—includes Oriental, Kurile, Okhotsk, and Aleutian Provinces, but not the Oregonian Province.

northern boreal Pacific—includes Okhotsk, Kurile, and Aleutian Provinces.

eastern boreal Pacific—includes Aleutian and Oregonian Provinces.

western boreal Pacific—includes Oriental, Kurile, and Okhotsk Provinces.

oceanic boreal Pacific—includes the Subarctic Province and Transition Zone.

temperate—includes boreal (cold-temperate) and warm-temperate provinces.

antitropical temperate—includes all temperate regions in both Northern and Southern Hemispheres.

temperate North Pacific—includes all temperate regions in the North Pacific.

eastern temperate Pacific—includes Aleutian, Oregonian, San Diegan, and Cortez Provinces.

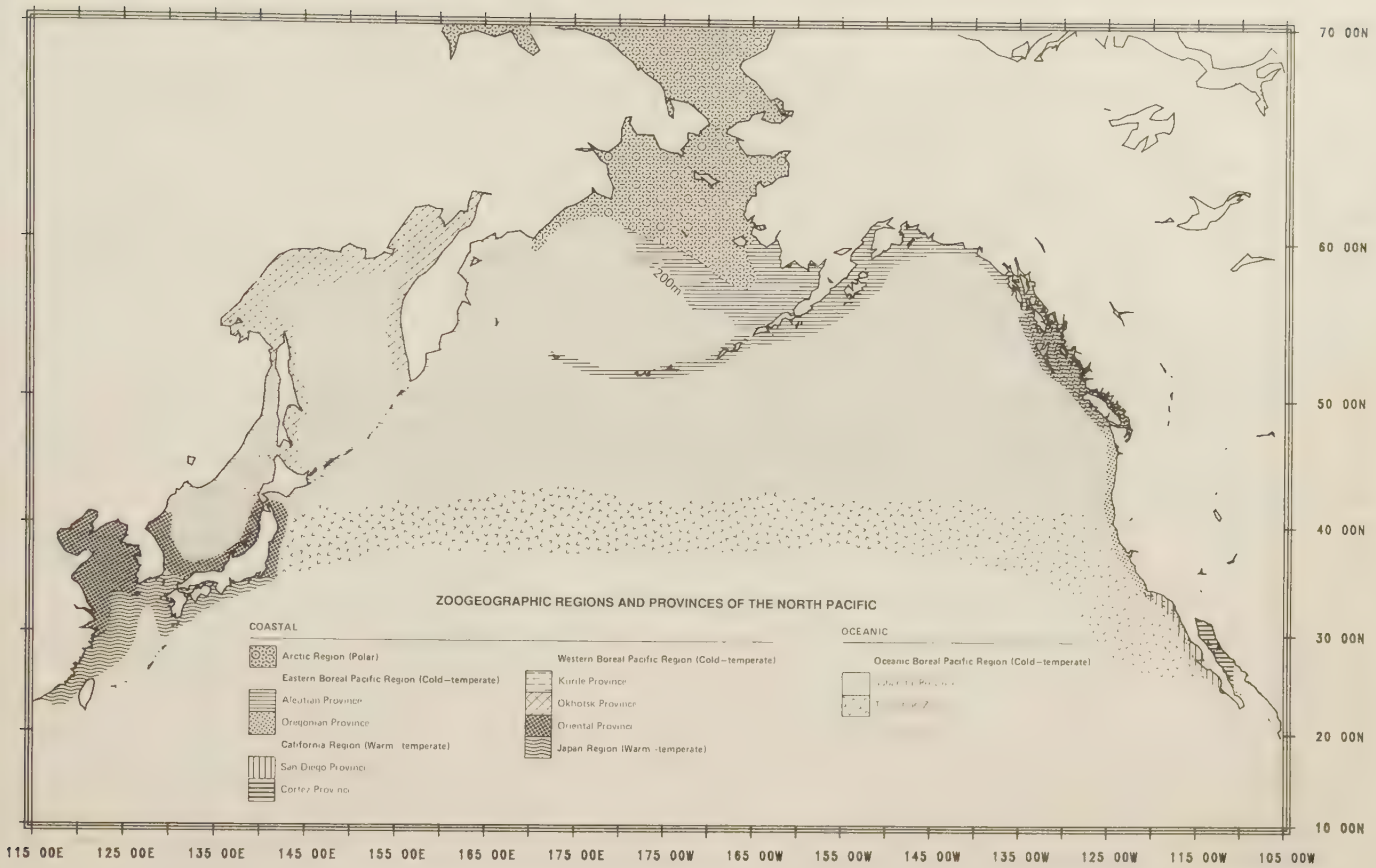


Figure 3
Zoogeographic provinces of the North Pacific.

Three geographic regions were considered "gray areas" in terms of classification. These include the Bering Sea from Nunivak Island and Cape Olyutorski to the Bering Strait; the coast from Sitka, Alaska, to Puget Sound, Washington; and the coast from Point Conception, California, to Cedros Island, Baja California. Each of these regions can be classed as either of two provinces recognized by Briggs (1974): Arctic or Aleutian for the Bering Sea, Aleutian or Oregonian for the eastern Gulf of Alaska, and Oregonian (Montereyan) or San Diegan for southern California-Baja California. If the range of a species extends from the north into one of the regions (but no further south), the region was included with the northern classification and the reverse if the species range was to the south. For instance, an Arctic species extending into the Bering Sea was considered to be Arctic and an Aleutian species extending to the Bering Strait was considered to be Aleutian even though both occurred in the northern Bering Sea. Species extending into the Chukchi Sea were considered Arctic although they may not extend further north.

Life zone classification scheme

Life zone classification schemes divide lifestyle regions (pelagic or benthic) into depth zones with different faunas. Other divisions of habitat (such as rocky bottom, soft-bottom, or kelp bed) are not considered in these schemes. Because many physical parameters (such as light intensity, pressure, and temperature) vary directly or indirectly with depth, organisms living in one zone are often quite different from those living in contiguous zones.

The most widely-used life zone classification scheme is that of Hedgpeth (1957a). This classification scheme divides the marine environment into two lifestyle regions: pelagic and benthic. The upper pelagic environment is divided into a Neritic Region above the shelf (0-200 m) and an Oceanic Region above the slope and basins. This latter region is divided into an Epipelagic Zone (0-100 m), a Mesopelagic Zone (100-1000 m), and a Bathypelagic Zone (1000-4000 m). The upper benthic environment is divided into an Intertidal Zone, a Sublittoral Zone (0-200 m), and a Bathyal Zone (200-4000 m). In addition, deep ocean (Abyssal, Abyssopelagic, and Hadal) and estuarine zones are included.

Hedgpeth (1957a) suggested that the shelf could be divided into Inner and Outer Sublittoral Zones, the former extending from 0 to 100 m and the latter from 100 to 200 m. Allen (1982) described three major zones for demersal fishes on the southern California shelf. These include an Inner Shelf Zone from 0 to 20 m, and Outer Shelf Zone from 20 to 80 m, and an Upper Slope Zone from 80 to 170 m (the shelf break is at 80 m). In the Bering Sea (the broadest

Table 2

Geographic limits of zoogeographic provinces of the Arctic-temperate Northern Hemisphere pertinent to distributions of common fishes in the Bering Sea and Northeastern Pacific (based primarily on McGowan 1971; Briggs 1974).

Zoogeographic regions and provinces	Geographic limits	
	Northern	Southern
Arctic Ocean		
Arctic Region	North Pole	*Above Atlantic*: Strait of Belle Isle, Labrador; northern Iceland; Murmansk coast, USSR. Includes Greenland and Spitsbergen. *Bering Sea*: Cape Olyutorski, USSR; and Nunivak Island, Alaska
Temperate North Pacific		
Boreal (cold-temperate)		
Eastern Pacific Region		
Aleutian Province	Nunivak Island; Aleutian Islands	Uncertain[a]. Sitka, Alaska; Dixon Entrance (Alaska-British Columbia border); or Cape Flattery, Washington
Oregonian Province	Uncertain[a]. Sitka, Alaska; Dixon Entrance (Alaska-British Columbia border); or Cape Flattery, Washington	Point Conception, California; discontinuously in upwelling areas of northern Baja California[b]
Western Boreal Pacific Region		
Kurile Province	Cape Olyutorski, USSR (western Bering Sea); includes eastern Kamchatka, USSR	Peter the Great Bay, USSR (western Sea of Japan); includes Kurile Islands, Hokkaido, Japan, and western Sea of Japan
Okhotsk Province	Northern Sea of Okhotsk; southern Kamchatka, USSR	Northern Hokkaido, Japan (includes all of Sea of Okhotsk)
Oriental Province	Northern Honshu, Japan	Yellow Sea, China; Cape Inubo, eastern Honshu, Japan (includes southern Sea of Japan but does not include southern South Korea or the south coast of Honshu)
Oceanic Boreal Pacific		
Subarctic Province	Sea of Okhotsk; Aleutian Basin; Gulf of Alaska	Lat. 43°N; Sea of Japan
Transition Zone	Lat. 43°N	Lat. 37°N (midocean); east-central Honshu, Japan; southern Baja California Sur
Warm-temperate		
California Region		
San Diego Province	Point Conception, California	Magdalena Bay, Baja California Sur, Mexico
Cortez Province[c]	Northern Gulf of California	La Paz, Baja California Sur; Topolobampo, Sinaloa, Mexico
Japan Region	Cape Inubo, Honshu, Japan	Formosa Strait, China (including the south coast of Honshu and southern South Korea)
Temperate North Atlantic		
Boreal (cold-temperate)		
Western Boreal Atlantic Region	Strait of Belle Isle, Labrador	Cape Hatteras, North Carolina
Eastern Boreal Atlantic Region	Murmansk coast, USSR	Western English Channel (includes southern Iceland)
Warm-temperate		
Carolina Region	Cape Hatteras, North Carolina	Cape Rojo, Mexico (does not include southern Florida)
Mediterranean-Atlantic Region		
Lusitania Province	English Channel	Cape Verde, Senegal (includes Mediterranean Sea)

[a]Briggs (1974) places this boundary at Dixon Entrance, but Peden and Wilson (1976) suggest that it may be at Sitka, Alaska, or Cape Flattery, Washington.
[b]The discontinuous distribution in northern Baja California was noted by Hubbs (1960). Hubbs (1974) noted that a Montereyan subprovince of this region may occur south of Cape Mendocino, California.
[c]Hubbs (1974) considered the Cortez Province to be more closely related to the Mexican Province of the Eastern Tropical Pacific Region than to the San Diego Province.

shelf in the region we studied) there are three faunistically-important hydrographic domains: 1) Inner Shelf (0-50 m); 2) Middle Shelf (50-100 m); and 3) Outer Shelf (100-150 m; Kaimmer et al. 1976; Kinder and Schumacher 1981; Smith and Bakkala 1982). The shelf break occurs at 170 m.

At present there is no consensus on the number and location of subdivisions of the Bathyal Zone (Menzies et al. 1973). Fedorov (1973a), based upon Bering Sea fishes, divided the bathyal environment into two zones: Mesobenthal (200-500 m) and Bathybenthal (500-2500 m). In this scheme the Abyssal (Abyssobenthal) Zone begins at 2500 m rather than at 4000 m, as proposed by Hedgpeth (1957a).

Based on the above information, the following life zone classification scheme was used in this study (Fig. 4): 1) Peripheral environments—Fluvial (riverine), Estuarine, and Intertidal Zones; 2) Pelagic environments—Neritic (0-200 m) and Oceanic (Epipelagic, 0-200 m; Mesopelagic, 200-1000 m; Bathypelagic, 1000-4000 m) Zones; and 3) Benthic environments—Sublittoral (Inner Shelf, 0-50 m; Middle Shelf, 50-100 m; Outer Shelf, 100-200 m) and Bathyal (Mesobenthal, 200-500 m; Bathybenthal, 500-2500 m). The depth range of the Epipelagic Zone was arbitrarily extended to 200 m to make it equivalent to the depth range of the Neritic Zone. It should be noted that the Inner Shelf Zone may actually end at depths shallower than 50 m in some parts of the study area.

The species were classified as pelagic or demersal based upon their use of the benthic environment. Pelagic species are regarded here as species which do not use the benthic marine environment during foraging or for refuge (although they may deposit untended

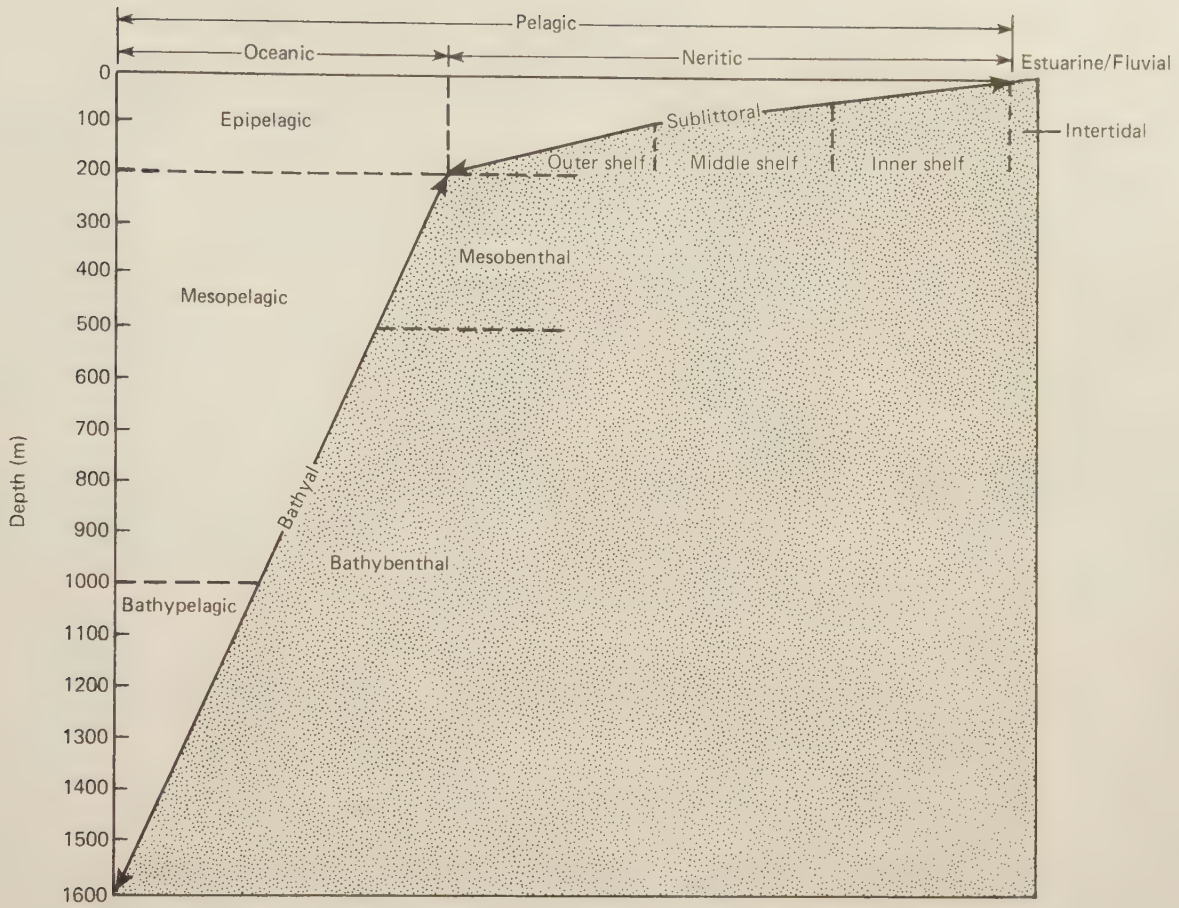


Figure 4
Coastal marine life zones.

demersal eggs or be captured near the bottom by demersal trawls). Demersal species are considered here to be species that use the benthic marine environment during foraging, for refuge, or for nest sites. Some of these species may spend a considerable amount of their time in the water column while others stay on or near the bottom. Some pelagic or demersal species could have been placed in the opposite category given that the categories were defined differently.

The species were assigned to life zone categories based on the range of life zones that include about 95% of the occurrences of each species. Fluvial, estuarine, intertidal, and epipelagic zones were included in the category name if these are important adult or juvenile habitats or spawning areas. The presence of pelagic juveniles was not considered when assigning species to categories. In addition to the range descriptor of the life zone occupied by a species, the life zone of the modal depth of occurrence was also included.

CHARACTERISTICS OF COMMON SPECIES

A total of 124 fish species (including three species complexes), representing 31 families, were found in 100 or more survey samples (Table 3). Families represented by the largest number of species were: Scorpaenidae 26; Pleuronectidae 18; Cottidae 17; Zoarcidae 8; Agonidae 6; Gadidae 5; Cyclopteridae 5; Rajidae 4; and Stichaeidae 4. Sixteen families were represented by only one species.

In general, the species composition of the catch data showed the effects of the extensive sampling effort that had been conducted off Alaska. Nearly all of the most common species were northern, coldwater fishes (Table 4). Species that showed the highest frequency of occurrence among the 24,881 survey samples analyzed were the following: walleye pollock, *Theragra chalcogramma* (occurring in 59.9% of the samples); arrowtooth flounder, *Atheresthes stomias* (52.3%); flathead sole, *Hippoglossoides elassodon* (50.9%); Pacific cod, *Gadus macrocephalus* (49.8%); Pacific halibut, *Hippoglossus stenolepis* (39.1%); and rock sole, *Pleuronectes bilineatus* (35.0%).

Table 3

List of fish species collected from the Chukchi Sea to southern California that were found in 100 or more samples.[1]

Species	Common name
Class Chondrichthyes	
Order Chimaeriformes	
Chimaeridae	
Hydrolagus colliei	Spotted ratfish
Order Squaliformes	
Squalidae	
Squalus acanthias	Spiny dogfish
Order Rajiformes	
Torpedinidae	
Torpedo californica	Pacific electric ray
Rajidae	
Bathyraja interrupta	Bering skate
Raja binoculata	Big skate
R. rhina	Longnose skate
R. stellulata complex[2]	"Starry skate"[2]
Class Osteichthyes	
Order Clupeiformes	
Clupeidae	
Alosa sapidissima	American shad
Clupea pallasii	Pacific herring
Order Salmoniformes	
Bathylagidae	
Leuroglossus schmidti[3]	Northern smoothtongue[4]
Osmeridae	
Mallotus villosus	Capelin
Osmerus mordax	Rainbow smelt
Thaleichthys pacificus	Eulachon
Salmonidae	
Oncorhynchus tshawytscha	Chinook salmon
Order Stomiiformes	
Chauliodontidae	
Chauliodus macouni	Pacific viperfish
Order Gadiformes	
Macrouridae	
Albatrossia pectoralis	Giant grenadier[5]
Coryphaenoides cinereus	Popeye grenadier[6]
Merlucciidae	
Merluccius productus	Pacific hake
Gadidae	
Boreogadus saida	Arctic cod
Eleginus gracilis	Saffron cod
Gadus macrocephalus	Pacific cod
Microgadus proximus	Pacific tomcod
Theragra chalcogramma	Walleye pollock
Moridae	
Antimora microlepis	Pacific flatnose[5]
Order Batrachoidiformes	
Batrachoididae	
Porichthys notatus	Plainfin midshipman
Order Scorpaeniformes	
Scorpaenidae	
Sebastes aleutianus	Rougheye rockfish
S. alutus	Pacific ocean perch
S. aurora	Aurora rockfish
S. babcocki	Redbanded rockfish
S. borealis	Shortraker rockfish
S. brevispinis	Silvergray rockfish
S. ciliatus	Dusky rockfish
S. crameri	Darkblotched rockfish
S. diploproa	Splitnose rockfish
S. elongatus	Greenstriped rockfish
S. entomelas	Widow rockfish
S. flavidus	Yellowtail rockfish
S. goodei	Chilipepper
S. helvomaculatus	Rosethorn rockfish
S. jordani	Shortbelly rockfish
S. melanostomus	Blackgill rockfish
S. paucispinis	Bocaccio
S. pinniger	Canary rockfish
S. polyspinis	Northern rockfish
S. proriger	Redstripe rockfish
S. ruberrimus	Yelloweye rockfish
S. rubrivinctus	Flag rockfish
S. saxicola	Stripetail rockfish
S. variegatus	Harlequin rockfish
S. zacentrus	Sharpchin rockfish
Sebastolobus alascanus	Shortspine thornyhead
Anoplopomatidae	
Anoplopoma fimbria	Sablefish
Hexagrammidae	
Hexagrammos stelleri	Whitespotted greenling
Ophiodon elongatus	Lingcod
Pleurogrammus monopterygius	Atka mackerel
Cyclopteridae	
Aptocyclus ventricosus	Smooth lumpsucker
Careproctus melanurus complex[7]	"Blacktail snailfish"[7]
Careproctus rastrinus complex[8]	"Pink snailfish"[8]
Eumicrotremus orbis	Pacific spiny lumpsucker
Liparis gibbus	Dusky snailfish[5]
Psychrolutidae	
Dasycottus setiger	Spinyhead sculpin
Malacocottus kincaidi	Blackfin sculpin
M. zonurus	Darkfin sculpin[9]
Agonidae	
Aspidophoroides bartoni	Aleutian alligatorfish
Bathyagonus nigripinnis	Blackfin poacher
Occella dodecaedron	Bering poacher
O. verrucosa	Warty poacher
Podothecus acipenserinus[10]	Sturgeon poacher
Sarritor frenatus	Sawback poacher
Hemitripteridae[11]	
Hemitripterus bolini	Bigmouth sculpin
Cottidae	
Enophrys diceraus	Antlered sculpin
Gymnocanthus galeatus	Armorhead sculpin
G. pistilliger	Threaded sculpin[5]
G. tricuspis	Arctic staghorn sculpin
Hemilepidotus hemilepidotus	Red Irish lord
H. jordani	Yellow Irish lord
H. papilio[12]	Butterfly sculpin
Icelinus filamentosus	Threadfin sculpin
Icelus canaliculatus	Porehead sculpin[13]
I. spiniger	Thorny sculpin
Myoxocephalus jaok	Plain sculpin
M. polyacanthocephalus	Great sculpin
M. verrucosus	Warty sculpin
Triglops forficata	Scissortail sculpin
T. macellus	Roughspine sculpin
T. pingeli	Ribbed sculpin
T. scepticus	Spectacled sculpin
Order Perciformes	
Embiotocidae	
Zalembius rosaceus	Pink seaperch
Bathymasteridae	
Bathymaster signatus	Searcher
Ronquilus jordani	Northern ronquil
Zoarcidae	
Bothrocara brunneum	Twoline eelpout[5]
Lycodes brevipes	Shortfin eelpout
L. concolor[14]	Ebony eelpout[13]
L. cortezianus	Bigfin eelpout
L. diapterus	Black eelpout
L. palearis	Wattled eelpout
L. raridens	Marbled eelpout[9]
L. turneri	Polar eelpout
Stichaeidae	
Lumpenella longirostris	Longsnout prickleback
Lumpenus fabricii	Slender eelblenny
L. maculatus	Daubed shanny
L. sagitta	Snake prickleback

Table 3 (Continued)

Species	Common name
Class Osteichthyes (Continued)	
Order Perciformes (Continued)	
Zaproridae	
Zaprora silenus	Prowfish
Trichodontidae	
Trichodon trichodon	Pacific sandfish
Ammodytidae	
Ammodytes hexapterus	Pacific sand lance
Order Pleuronectiformes	
Paralichthyidae	
Citharichthys sordidus	Pacific sanddab
Pleuronectidae	
Atheresthes evermanni	Kamchatka flounder
A. stomias	Arrowtooth flounder
Eopsetta exilis[15]	Slender sole
E. jordani	Petrale sole
Errex zachirus[15]	Rex sole
Hippoglossoides elassodon	Flathead sole
H. robustus	Bering flounder
Hippoglossus stenolepis	Pacific halibut
Microstomus pacificus	Dover sole
Platichthys stellatus	Starry flounder
Pleuronectes asper[15]	Yellowfin sole
P. bilineatus[15]	Rock sole
P. isolepis[15]	Butter sole
P. proboscideus[15]	Longhead dab
P. quadrituberculatus	Alaska plaice
P. vetulus[15]	English sole
Psettichthys melanostictus	Sand sole
Reinhardtius hippoglossoides	Greenland halibut

[1]Unless otherwise noted, common names are from Robins (1980) and the scientific names from Eschmeyer and Herald (1983). Higher taxa and their sequential order are from Nelson, J.S. (1984) except for Gadiformes, which follows Cohen (1984) and Scorpaeniformes, which is modified in part by Yabe (1985). Paralichthyidae (= Bothidae, in part) is from Ahlstrom et al. (1984a).

[2]Probably includes Alaska skate, *Bathyraja parmifera*, and starry skate, *Raja stellulata*.

[3]Peden (1981)

[4]Fedorov (1973b)

[5]Eschmeyer and Herald (1983)

[6]Ichthyological Society of Japan (1981)

[7]May include the Alaska snailfish, *Careproctus colletti*; blackfinned snailfish, *C. cypselurus*; forktail snailfish, *C. furcellus*; and blacktail snailfish, *C. melanurus*.

[8]May include the pink snailfish, *Careproctus osborni*; monster snailfish, *C. phasma*; salmon snailfish, *C. rastrinus*; and peachskin snailfish, *C. scottae*.

[9]Kessler (1985)

[10]Ilina (1978)

[11]Yabe (1985)

[12]Peden (1978)

[13]New common name.

[14]This species was recorded in the data as *Lycodes soldatovi*. E. M. Anderson (Dep. Ichthyol., Calif. Acad. Sci., San Francisco, CA 94118, pers. commun. April 1984) considers this species to be a junior synonym of *Lycodes concolor*.

[15]Sakamoto (1984)

Table 4

The 25 most common fish species, from the Chukchi Sea and Bering Sea to southern California, in order of frequency of occurrence in surveys. Total number of samples = 24,881.

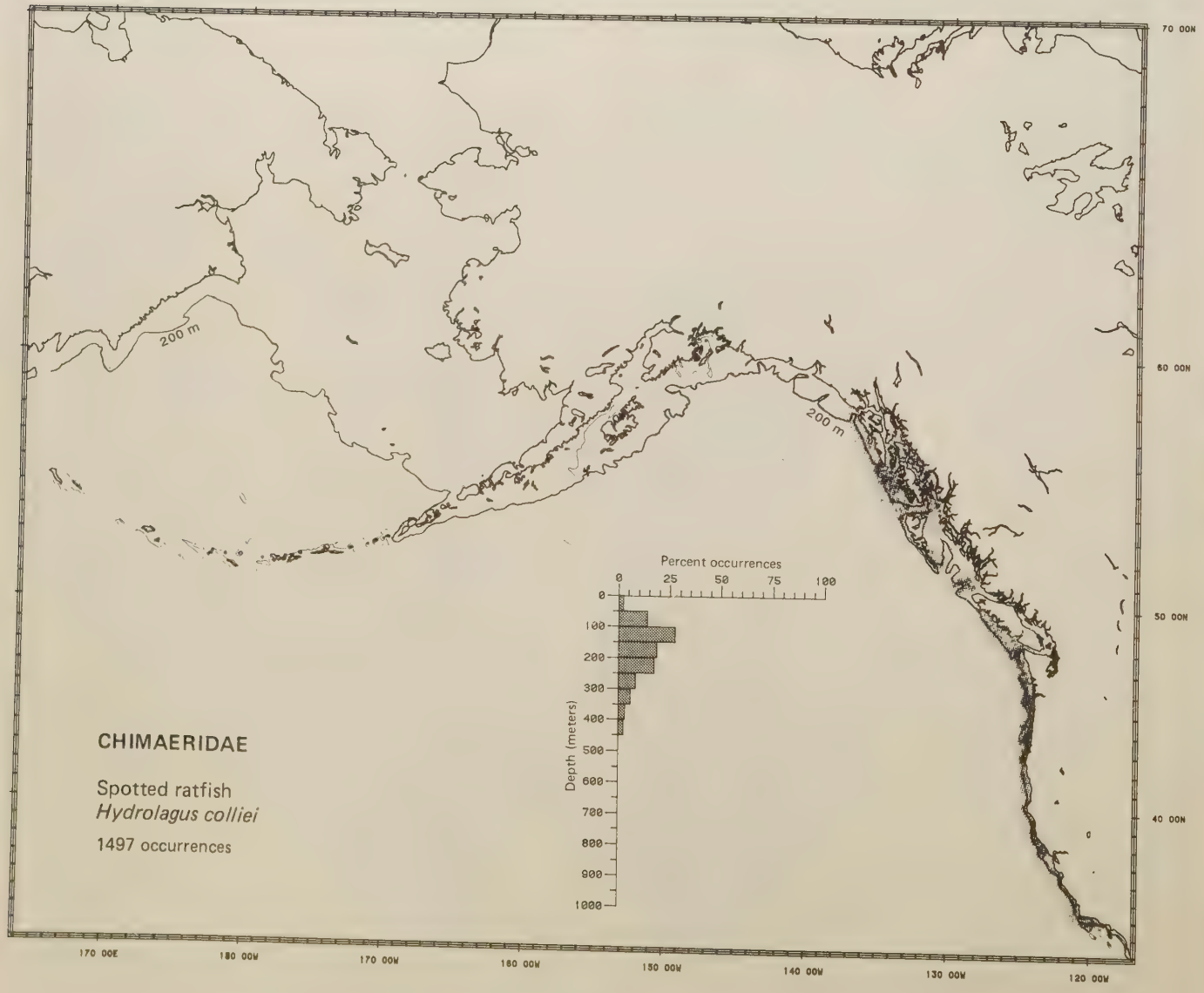
Rank	Species	Frequency	Percent frequency
1	Walleye pollock, *Theragra chalcogramma*	14,912	59.9
2	Arrowtooth flounder, *Atheresthes stomias*	13,004	52.3
3	Flathead sole, *Hippoglossoides elassodon*	12,676	50.9
4	Pacific cod, *Gadus macrocephalus*	12,402	49.8
5	Pacific halibut, *Hippoglossus stenolepis*	9,719	39.1
6	Rock sole, *Pleuronectes bilineatus*	8,720	35.0
7	Rex sole, *Errex zachirus*	8,133	32.7
8	Sablefish, *Anoplopoma fimbria*	7,259	29.2
9	Yellowfin sole, *Pleuronectes asper*	6,978	28.0
10	Dover sole, *Microstomus pacificus*	5,142	20.7
11	Greenland halibut, *Reinhardtius hippoglossoides*	4,811	19.3
12	Alaska plaice, *Pleuronectes quadrituberculatus*	4,780	19.2
13	Pacific ocean perch, *Sebastes alutus*	4,378	17.6
14	Yellow Irish lord, *Hemilepidotus jordani*	4,000	16.1
15	Pacific herring, *Clupea pallasii*	3,409	13.7
16	Eulachon, *Thaleichthys pacificus*	3,104	12.5
17	Shortspine thornyhead, *Sebastolobus alascanus*	3,024	12.2
18	Sturgeon poacher, *Podothecus acipenserinus*	2,916	11.7
19	Spinyhead sculpin, *Dasycottus setiger*	2,802	11.3
20	Bigmouth sculpin, *Hemitripterus bolini*	2,712	10.9
21	Wattled eelpout, *Lycodes palearis*	2,477	10.0
22	Capelin, *Mallotus villosus*	2,345	9.4
23	Shortfin eelpout, *Lycodes brevipes*	2,236	9.0
24	Rougheye rockfish, *Sebastes aleutianus*	2,151	8.6
25	Great sculpin, *Myoxocephalus polyacanthocephalus*	2,133	8.6

Literature Reported from southeast Alaska to Sebastian Vizcaino Bay, Baja California, and in the northern part of the Gulf of California (Miller and Lea 1972; Eschmeyer and Herald 1983), at depths of 0 to 913 m (Dean 1906; Eschmeyer and Herald 1983).

Survey data Found from Cape Spencer in southeast Alaska to Oxnard, California. Depth range 25 to 575 m, greatest frequency of occurrence (27.4%) on the outer shelf between 100 and 150 m, and 95.0% from 50 to 400 m in depth. Survey data provide a more specific northern limit of the range.

Conclusions

Zoogeography	Oregonian-Californian
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	Cape Spencer, Alaska, to Sebastian Vizcaino Bay, Baja California, and the northern Gulf of California
Depth	0 to 913 m



SPINY DOGFISH, *Squalus acanthias* Linnaeus 1758

Literature Found in predominantly temperate regions in both Northern and Southern Hemispheres. In the North Pacific, from the Bering Sea to central Baja California (and possibly the Gulf of California) in the east (Miller and Lea 1972; Hart 1973; Compagno 1984); from eastern Kamchatka and the Sea of Okhotsk to the southwestern Yellow Sea off China in the west (Bigelow and Schroeder 1957; Jones and Geen 1976; Compagno 1984). Occurs along the Aleutians to Attu Island (Okada and Kobayashi 1968). In the North Atlantic, from southern Greenland and southeastern Baffin Island to Cuba in the west and from the Murman Coast of the Barents Sea and Iceland south to Senegal and the Canary Islands, including the Mediterranean and Black Seas, in the east (Bigelow and Schroeder 1957). In the Southern Hemisphere, along Africa south of lat. 27°S (at least in the west; Bass et al. 1976), Reunion Island (Bigelow and Schroeder 1957), southeastern and southern Australia, Tasmania, possibly Papua-New Guinea, New Zealand, Chile, Argentina, and Uruguay (Bigelow and Schroeder 1957; Jones and Geen 1976; Compagno 1984). Depth range reported from the surface and intertidal to 900 m (Compagno 1984).

Survey data Found from Zhemchug Canyon on the central slope of the eastern Bering Sea and Unalaska Island in the Aleutian Islands south to San Nicolas Island in southern California; in the Bering Sea, found discontinuously along the outer shelf and slope in the southeast. Depth range 25 to 575 m; most occurrences (29.4%) on the outer shelf between 100 and 150 m, and 95.9% from depths of ⩽350 m. These data add more detailed information on distribution in the Bering Sea and provide a northern limit in the northeastern Pacific.

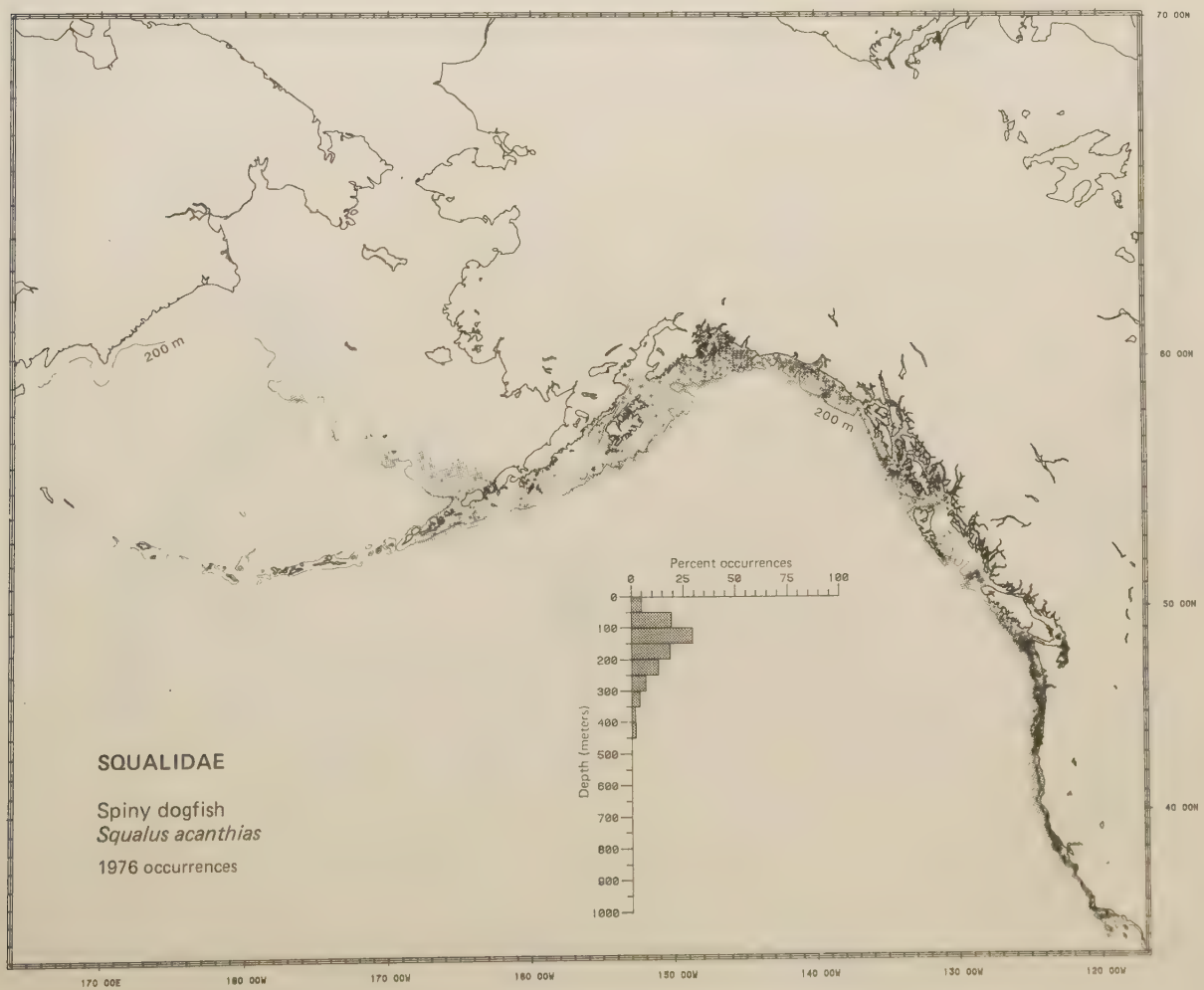
Conclusions

Zoogeography Antitropical-temperate

Life zone Inner shelf-mesobenthal (outer slope)

Range In temperate regions in the North Atlantic and Pacific, and off South America, southern Africa, Reunion Island, Australia, and New Zealand. In the North Pacific from the coast of China (southwestern Yellow Sea) to Zhemchug Canyon in the Bering Sea, west in the Aleutian Islands to Attu Island, and south to central Baja California (and possibly the Gulf of California).

Depth From intertidal and surface to 900 m

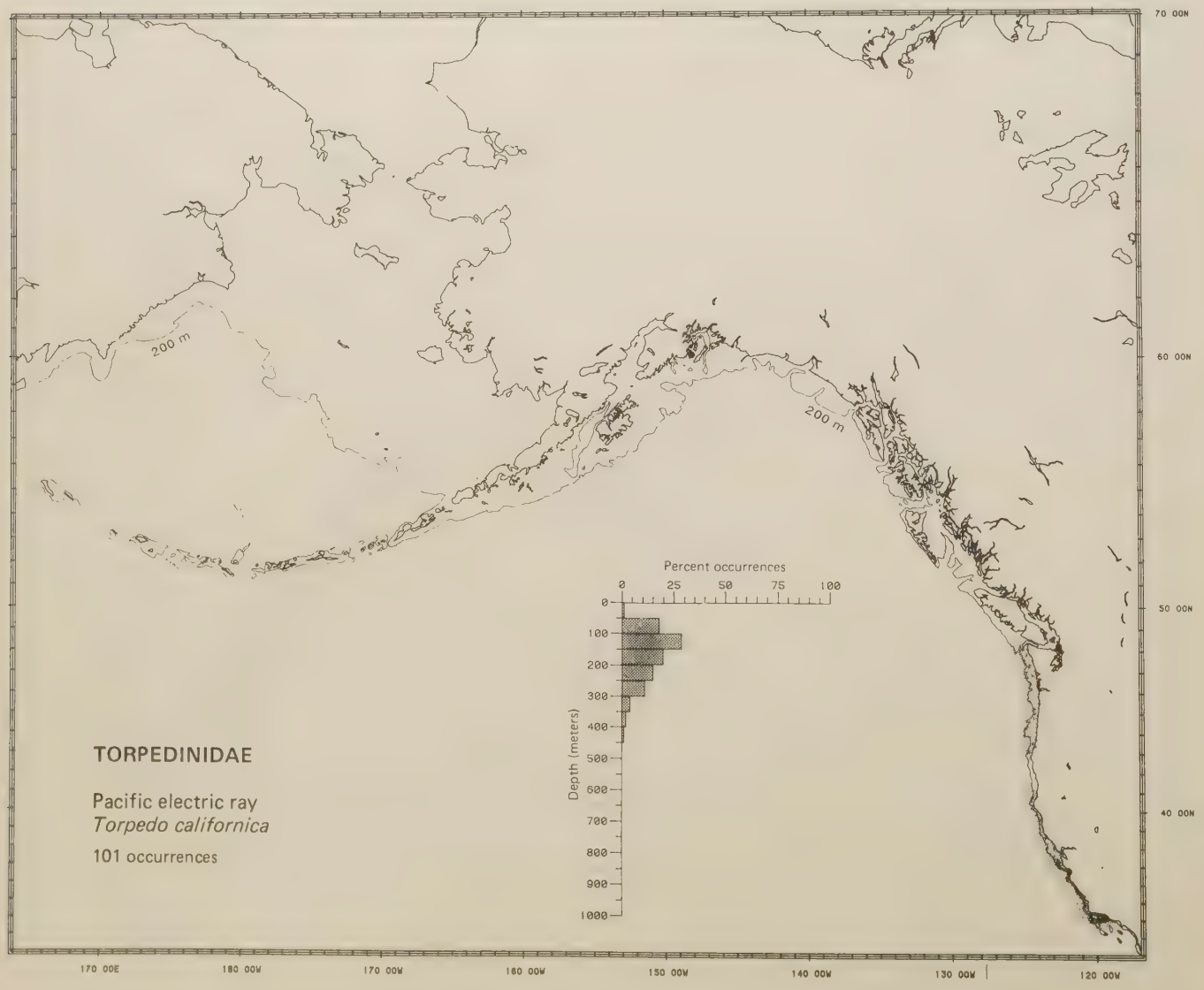


Literature Reported from Dixon Entrance, British Columbia, to Sebastian Vizcaino Bay, Baja California (Miller and Lea 1972; Hart 1973), at depths of 0 to 274 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Cape Flattery, Washington, to Oxnard, California. Depth range 25 to 425 m; found most frequently (28.7% of occurrences) on the outer shelf between 100 and 150 m, and 98.0% of occurrences from depths of 50 to 400 m. Although survey data were all within the known geographic range, the survey maximum depth of 425 m is a new record.

Conclusions

Zoogeography	Oregonian-San Diegan
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Dixon Entrance, British Columbia, to Sebastian Vizcaino Bay, Baja California
Depth	0 to 425 m



BERING SKATE, *Bathyraja interrupta* (Gill and Townsend 1897) — Rajidae: Skates

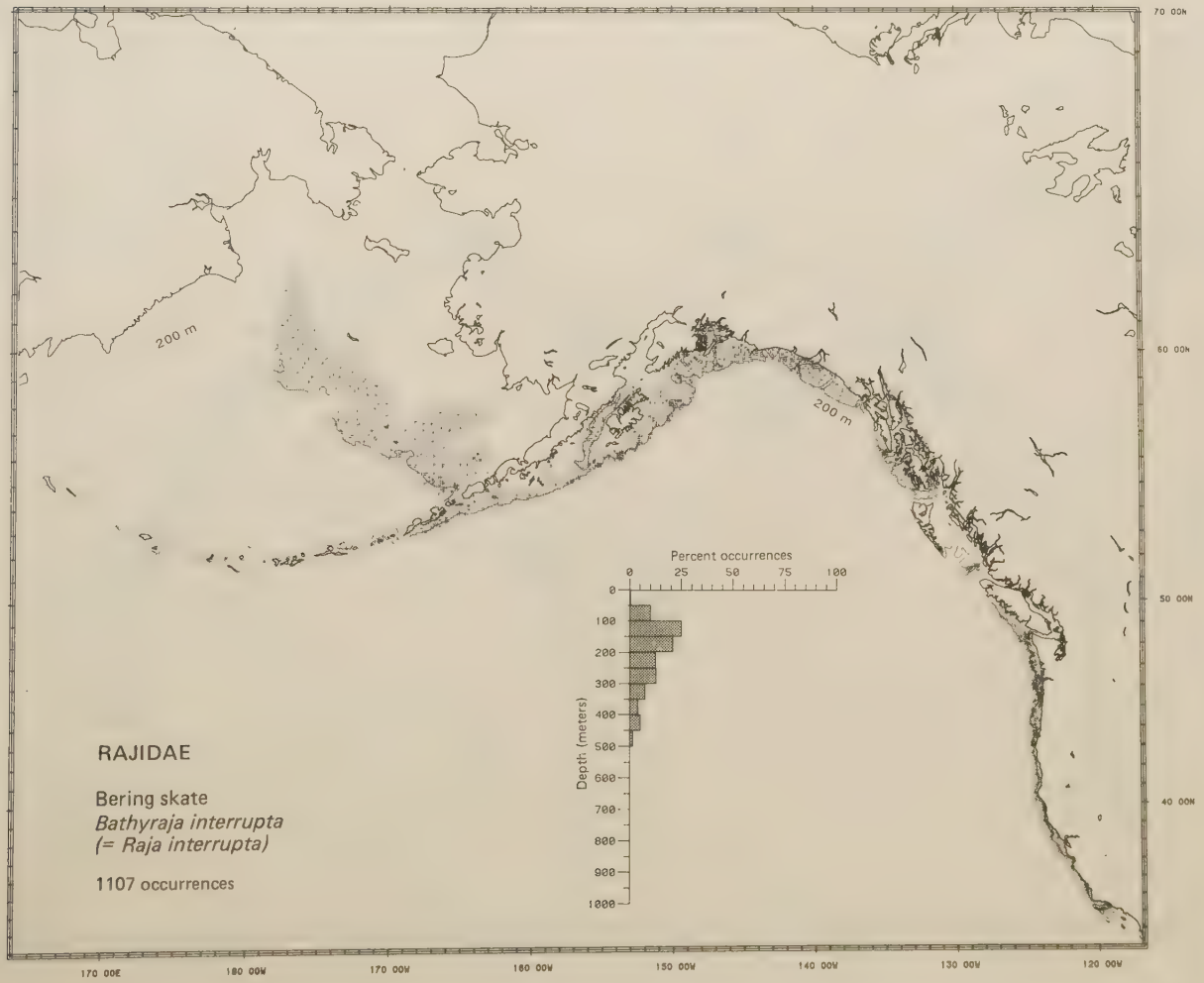
Taxonomic comment The Bering skate is *Raja interrupta* in Robins (1980), but has been placed in the genus *Bathyraja* by others more recently (e.g., Eschmeyer and Herald 1983; Ishihara and Ishiyama 1985). Ishihara and Ishiyama (1985) regard the sandpaper skate, *Bathyraja* (=*Raja*) *kincaidii*, to be the same species as the Bering skate, with *Bathyraja kincaidii* being a junior synonym of *Bathyraja interrupta*. In addition, an undescribed species, generally included with *Bathyraja kincaidii*, may also occur in the northeastern Pacific (J. D. McEachren, Dep. Wildl. Fish. Sci., Texas A&M Univ., College Station, TX 77843-2258, pers. commun. August 1983).

Literature Reported from the Bering Sea off Cape Navarin and Unalaska Island to Cortez Bank off southern California (Hart 1973; Howe 1981; Eschmeyer and Herald 1983; Ishihara and Ishiyama 1985) and in depth from 54 to 1380 m (Miller and Lea 1972; Howe 1981).

Survey data Found from the western Bering Sea off Cape Navarin and Agattu Island in the Aleutian Islands to Santa Barbara, California. In the Bering Sea, along the outer shelf. Depth range 25 to 725 m, most commonly (24.9% of occurrences) on the outer shelf between 100 and 150 m, and 97.5% of occurrences from depths of 50 to 450 m. Survey data extend the known range of this species along the Aleutian Islands, define its range in the Bering Sea, and extend its known range into more shallow water. However, the undescribed species may be included in the survey data (especially in the south) and, in the Bering Sea, other species of skates, such as the Alaska skate, *Bathyraja parmifera*, or Aleutian skate, *Bathyraja aleutica*, may have been confused with this species. Further study is needed on the systematics of this and other *Bathyraja* species to clarify their actual distribution.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From off Cape Navarin in the western Bering Sea and Agattu Island in the Aleutian Islands to Cortez Bank, California
Depth	25 to 1380 m

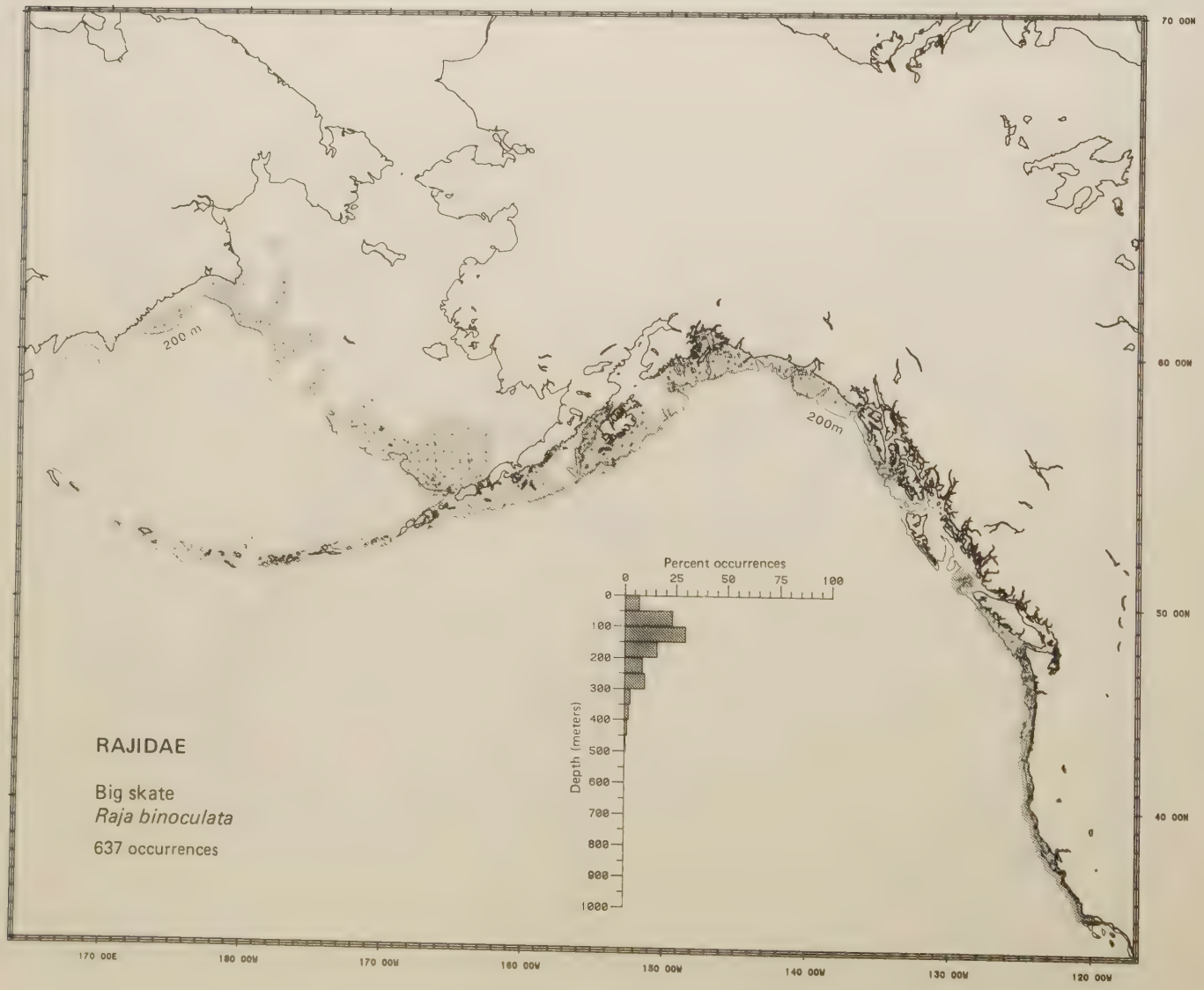


Literature Reported from the Bering Sea and Amchitka Island in the Aleutian Islands to Cedros Island, Baja California (Miller and Lea 1972; Simenstad et al. 1977; Eschmeyer and Herald 1983), at depths of 3 to 800 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from northeast of Cape Navarin to Glubokaya Bay in the western Bering Sea, along the outer shelf of the eastern Bering Sea, and along the Aleutian Islands to Stalemate Bank; occurred in survey catches from the Aleutians south to Santa Barbara, California. Depth range 25 to 725 m, most frequently (in 29.4% of occurrences) on the outer shelf from 100 to 150 m, and 96.1% of occurrences from depths <350 m. Although the survey data extend the known range of this species along the length of the Aleutian Islands and define its distribution in the Bering Sea, the Aleutian skate, *Bathyraja aleutica*, may have been confused with this species in these areas.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf mesobenthal (outer shelf)
Range	From Glubokaya Bay, Cape Navarin, and Stalemate Bank to Cedros Island, Baja California
Depth	3 to 800 m



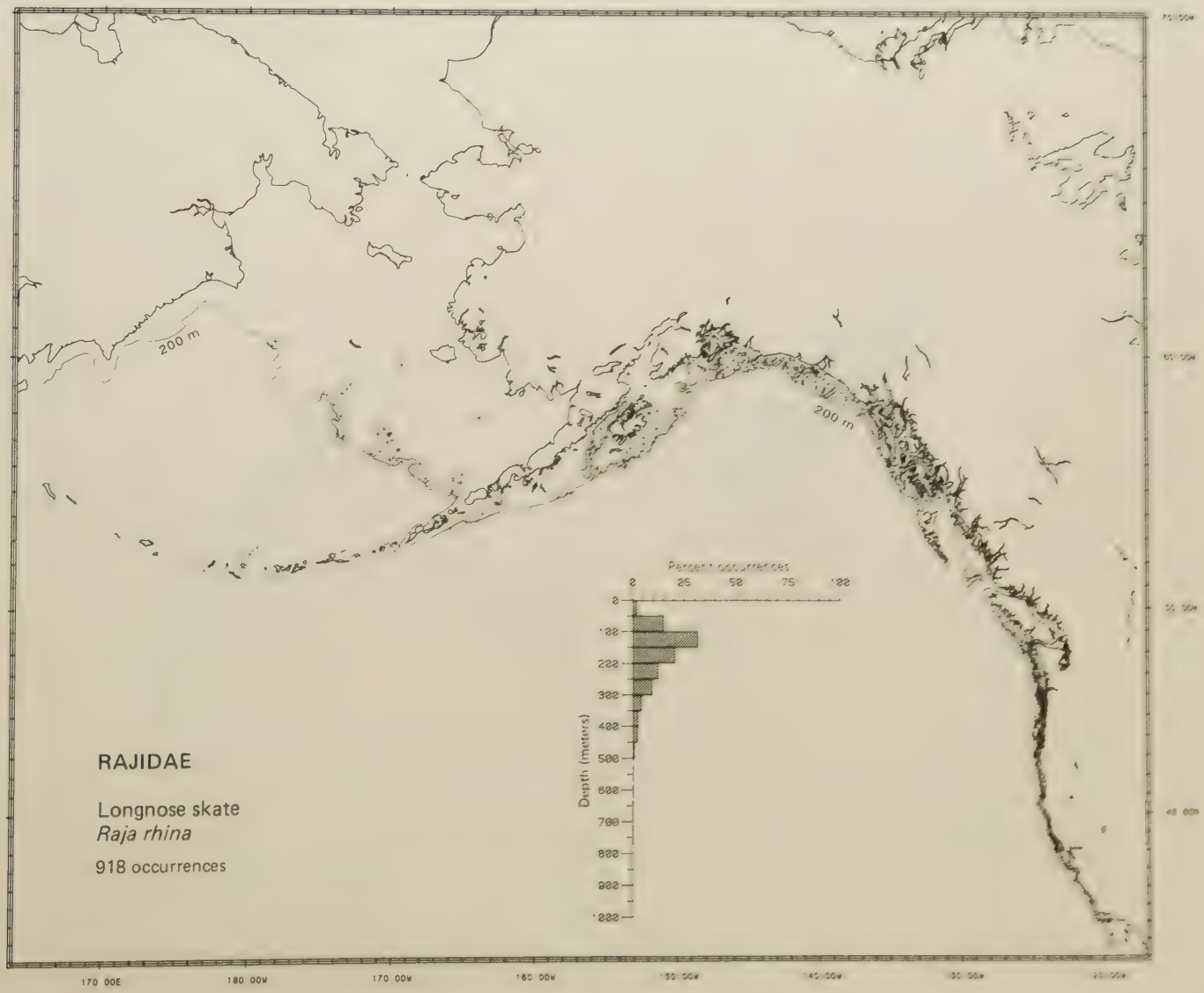
LONGNOSE SKATE, *Raja rhina* Jordan and Gilbert 1880

Literature Reported from the southeastern Bering Sea to Cedros Island, Baja California (Miller and Lea 1972: Kessler 1985), and from 55 to 622 m in depth (Eschmeyer and Herald 1983).

Survey data Found from Navarin Canyon in the eastern Bering Sea and Unalaska Island in the Aleutian Islands to the Patton Escarpment off San Nicolas Island in southern California. Depth range 25 to 675 m, most frequently (31.2% of occurrences) on the outer shelf between 100 and 150 m, and 96.6% of occurrences from depths ≤350 m. Survey data extend the known distribution of this species into the Bering Sea and slightly expand the known depth range of the species. However, the Aleutian skate, *Bathyraja aleutica*, may have been confused with this species in the Bering Sea.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From Navarin Canyon in the Bering Sea and Unalaska Island in the Aleutian Islands to Cedros Island, Baja California
Depth	25 to 675 m (new depth range)

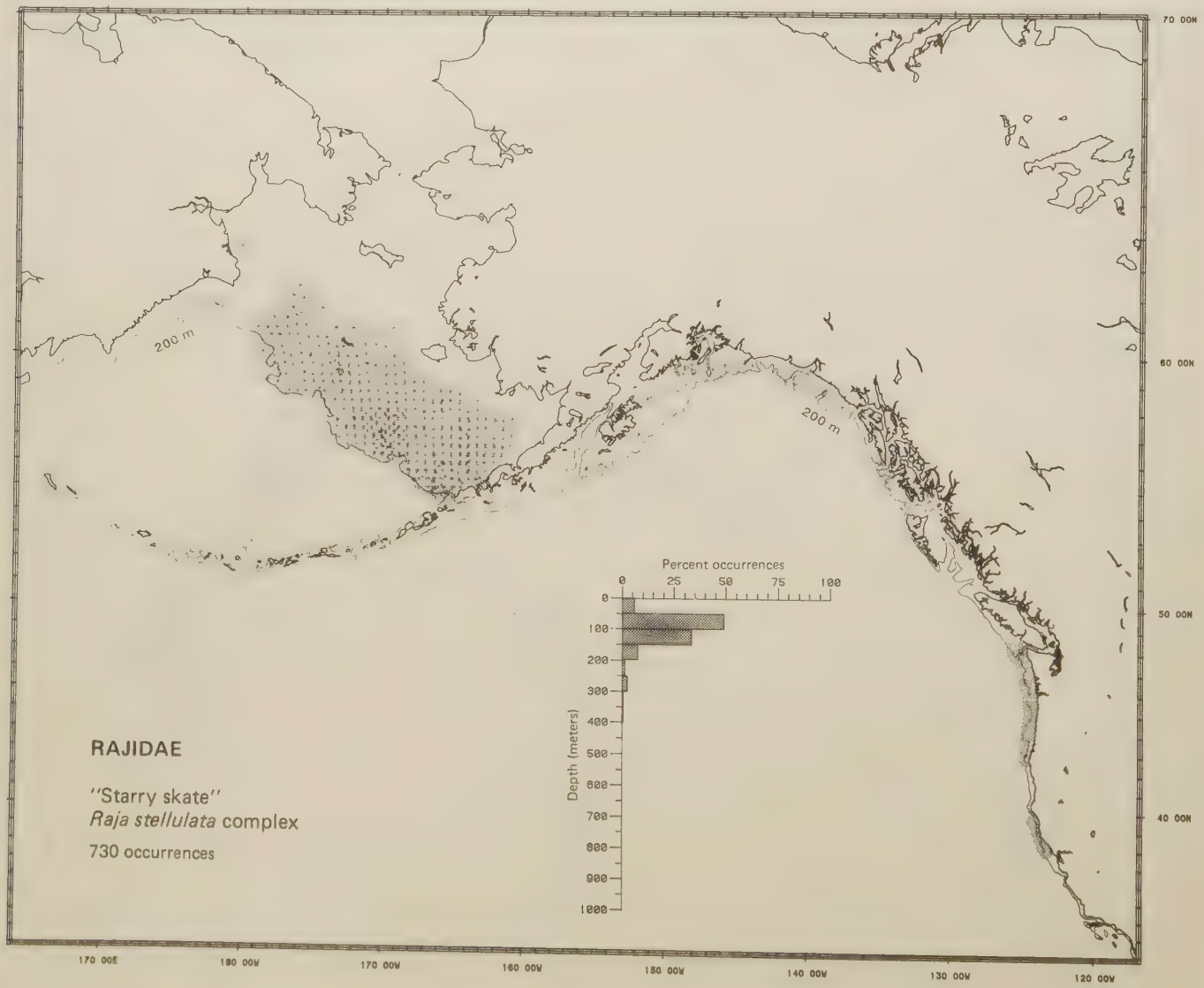


Taxonomic comment This complex includes at least two species: the Alaska skate, *Bathyraja parmifera* (Bean 1881), and the starry skate, *Raja stellulata* Jordan and Gilbert 1880, which have been called "starry skate" in the field. Field characters used for distinguishing the two species have only recently been well described (see Eschmeyer and Herald 1983).

Literature The starry skate has been reported from the Bering Sea and Unalaska Island to northern Baja California at depths of 18 to 732 m (Wilimovsky 1964; Eschmeyer and Herald 1983). The Alaska skate has been reported from the western Bering Sea and Amchitka Island to southeastern Alaska at depths of 18 to 1000 m (Andriyashev 1939; Fedorov 1973a; Simenstad et al. 1977; Eschmeyer and Herald 1983; Baxter 1985).

Survey data Taken in surveys from Cape Navarin in the western Bering Sea and west of the Delarof Islands in the Aleutian Islands to Point Reyes, California. Depth range 25 to 675 m, most frequently (48.8% of occurrences) on the middle shelf between 50 and 100 m, and 94.9% of occurrences from depths ≤200 m. Survey data for this complex of species cannot be used to describe range limits; however, the data do show the distribution of this complex in the Bering Sea, and may be of use to future taxonomic and ecological studies. Most records of this complex in the Bering Sea and Aleutian Islands are probably of Alaska skate, and most south of southeastern Alaska are probably starry skate. Relative abundance of the two species in the Gulf of Alaska is not known at present, although the Alaska skate is probably the more abundant species.

Conclusions "Starry skate" complex consists of two or more boreal Pacific, sublittoral species that need to be accurately identified in field collections before any conclusion concerning the distribution of the individual species can be reached.



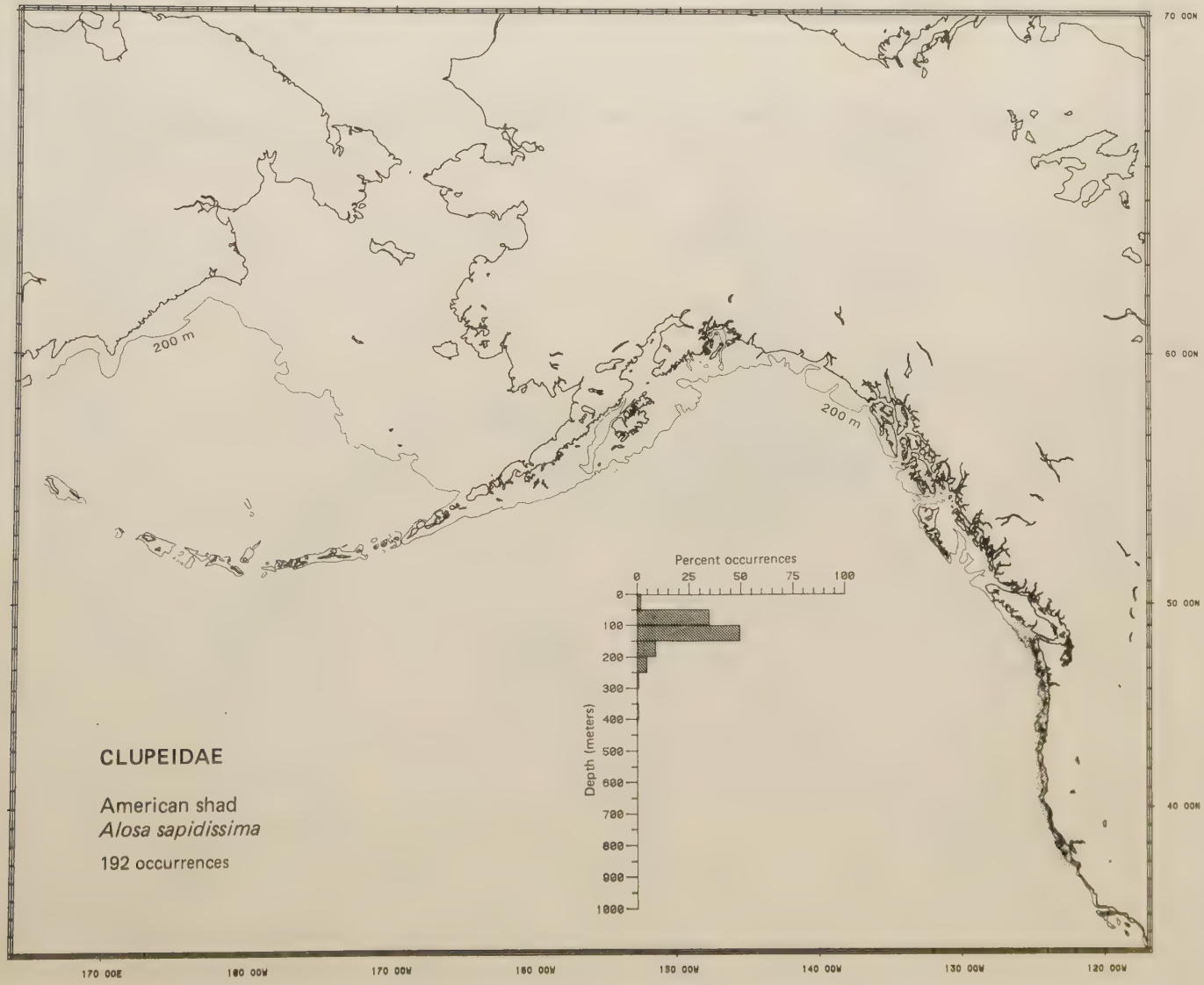
AMERICAN SHAD, *Alosa sapidissima* (Wilson ca. 1811)

Literature Original range of this species is in the western North Atlantic from Sand Hill River, Labrador, to Indian River, Florida (Lee et al. 1980; Morrow 1980). The species is pelagic and anadromous, traveling more than 600 km up some east coast rivers (Hildebrand 1963; Moyle 1976). It was introduced to the Sacramento River, California, in 1871-81 and has spread in the North Pacific to Kamchatka and the Bering Sea in the north and to Todos Santos Bay, Baja California, in the south (Lee et al. 1980; Howe 1981). It is landlocked in Millerton Lake, California (Lee et al. 1980). The species has been reported from the surface to 183 m in depth (Howe 1981).

Survey data Found from southwestern Vancouver Island to Monterey Bay, California. Depth range 25 to 375 m, most frequently (49.5% of occurrences) on the outer shelf from 100 to 150 m, and 97.4% of occurrences from 50 to 250 m in depth. Survey data occur within the known geographic range, but include a greater maximum depth. However, because this species is epipelagic in the ocean and most of the survey samples were taken by bottom trawls, the species may have been taken near the surface but recorded at a greater depth.

Conclusions

Zoogeography	Amphiboreal American (western boreal Atlantic-northeastern boreal Pacific)
Life zone	Fluvial-oceanic (neritic)
Range	From Sand Hill River, Labrador to Indian River, Florida, in the Atlantic, and from Kamchatka to Todos Santos Bay, Baja California, in the Pacific; up to 600 km upstream
Depth	Surface to 250 m, possibly to 375 m



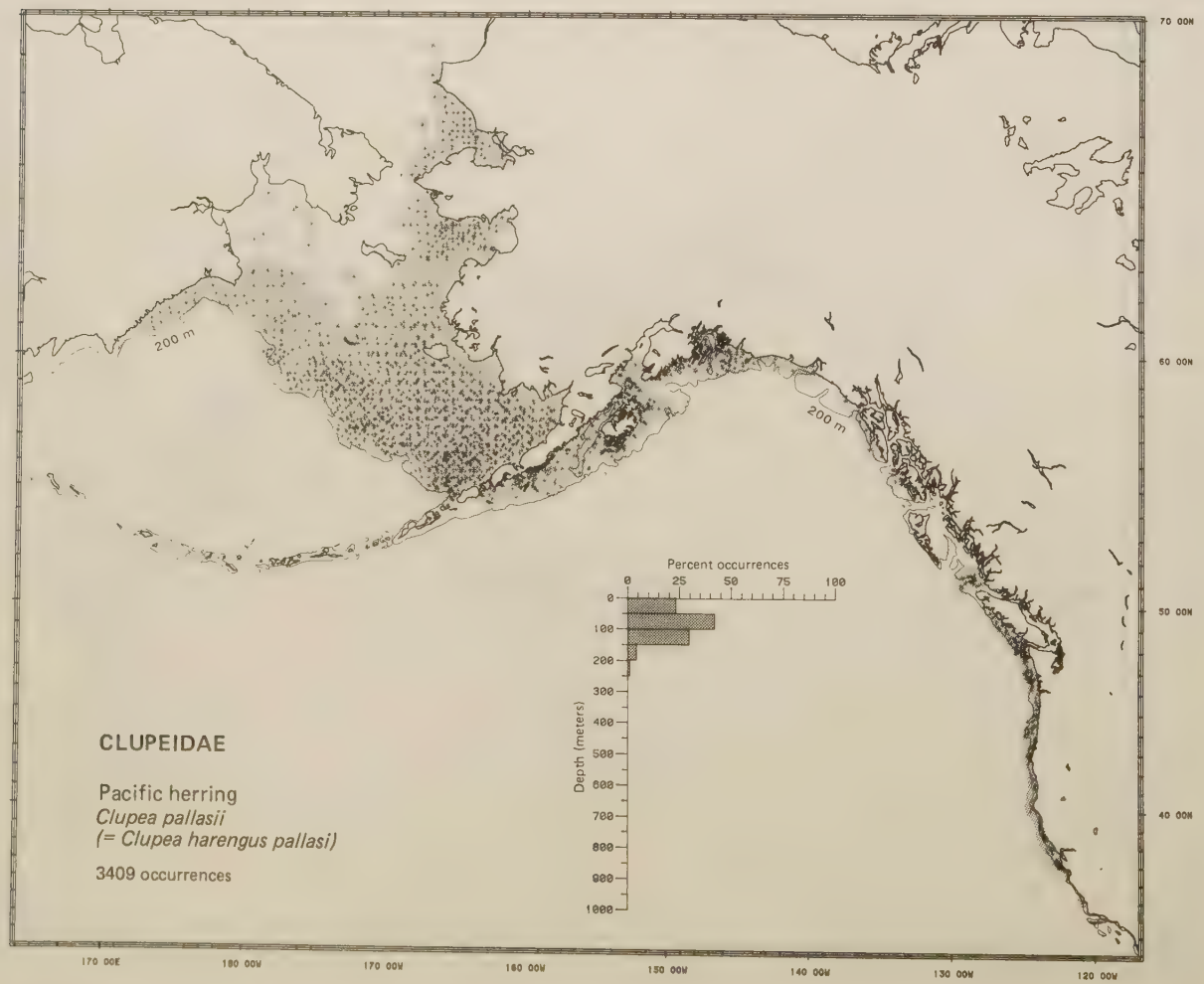
Taxonomic comment Regarded as *Clupea harengus pallasi* in Robins (1980) and, thus, a subspecies of the Atlantic herring, *Clupea harengus* Linnaeus 1758. Based on genetic differences, Grant (1986) considered the Atlantic and Pacific herring to be distinct species. The correct species name is *pallasii* rather than *pallasi* (Jordan and Evermann 1896-1900).

Literature In the North Pacific, the Pacific herring ranges from western Korea and the Sea of Okhotsk to the Bering Sea and south to Ensenada, Baja California (Hart 1973; Fitch and Lavenberg 1975). From the Bering Sea, into the Arctic, west to the White Sea, U.S.S.R., and east to the Coppermine River, Canada (Andriyashev 1954). In the Aleutian Islands, as far west as Adak Island (Wilimovsky 1964). Reported from the surface to 300 m (Andriyashev 1954). It is pelagic and also occurs in estuaries as far as the Oligohaline Zone (Moyle 1976; Simenstad 1983).

Survey data Found near Bering Island and from Cape Olyutorski to Anadyr Bay in the western Bering Sea, north of Cape Lisburne in the Chukchi Sea, throughout the eastern Bering Sea, and from Akutan Island in the Aleutian Islands south to Point San Luis, California. Depth range 25 to 475 m, most frequently (41.9% of occurrences) on the middle shelf from 50 to 100 m, and 94.6% of occurrences from depths ≤150 m. Survey data were within the known range, but provide a greater maximum depth for this species. However, because the Pacific herring is pelagic and surveys were conducted with bottom trawls and other nets, the species may have been taken near the surface but recorded at a greater depth.

Conclusions

Zoogeography	Arctic-circumboreal Pacific
Life zone	Estuarine-epipelagic (neritic)
Range	From the White Sea, U.S.S.R., and the Coppermine River, Canada, in the Arctic to western Korea and northern Baja California in the Pacific
Depth	Surface to 150 m, possibly to 475 m



NORTHERN SMOOTHTONGUE, *Leuroglossus schmidti* Rass 1955

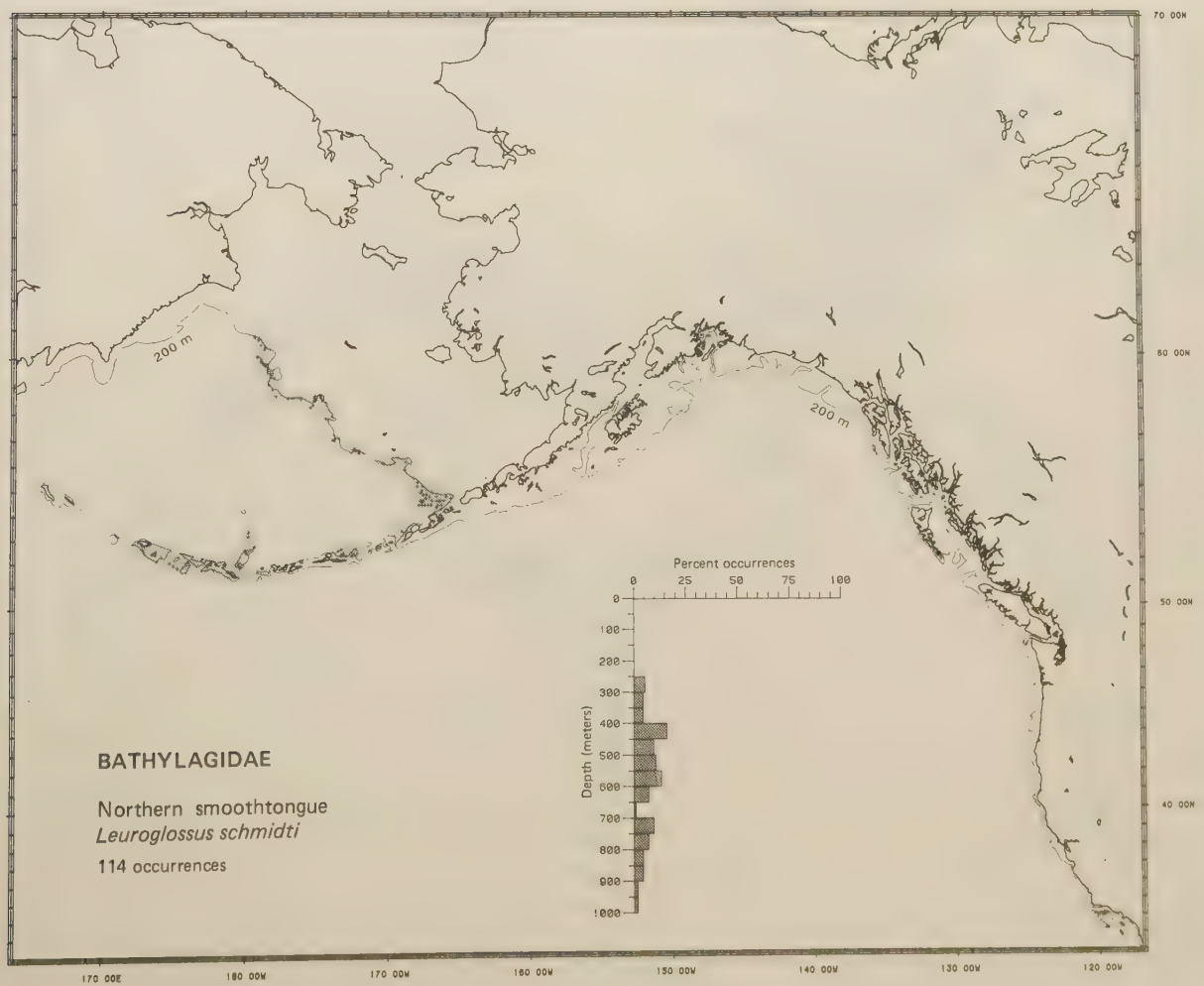
Taxonomic comment Regarded as a subspecies of the California smoothtongue, *Leuroglossus stilbius* Gilbert 1890, during much of the period covered by these surveys; hence this species was called California smoothtongue in the field. Peden (1981) presented evidence to separate the northern and California smoothtongue as distinct species. The California smoothtongue is *Bathylagus stilbius* in Robins (1980). Dunn (1983) presented detailed evidence for placing the two species in the genus *Leuroglossus*. Ahlstrom et al. (1984b), however, continue to regard the two species as *Bathylagus*.

Literature Reported from southeastern Hokkaido, Japan, and the Sea of Okhotsk to southern Vancouver Island, British Columbia (Borodulina 1968; Peden 1981). Species is pelagic and the eggs and larvae are found in the subarctic gyre south to about lat. 47°N (Dunn 1983). Reported from the surface to 1800 m (Fedorov 1973a), although adults are generally found at depths >150 m during the day (Peden 1981).

Survey data Taken in surveys along the slope of the eastern Bering Sea from Navarin Canyon to Unimak Island and along the Aleutian Islands to Attu Island; also taken off Baranof Island in southeastern Alaska. Depth range 275 to 975 m, most frequently (15.8% of occurrences) on the mesobenthal slope between 400 and 450 m, and 96.5% of occurrences between 250 and 900 m in depth. Although neither the known geographic nor depth range of this species were extended by the survey data, the depth range of frequent occurrence was more precisely defined. In addition, it should be noted that although the northern smoothtongue is a mesopelagic species, it was captured only along the slope. This probably reflects the distribution of demersal trawl tows rather than the distribution of the species. Few mesopelagic midwater tows were taken over the Aleutian Basin.

Conclusions

Zoogeography	Oceanic subarctic Pacific
Life zone	Mesopelagic
Range	From southeastern Hokkaido north to Navarin Canyon in the Bering Sea and south to southern British Columbia
Depth	Surface to 1800 m

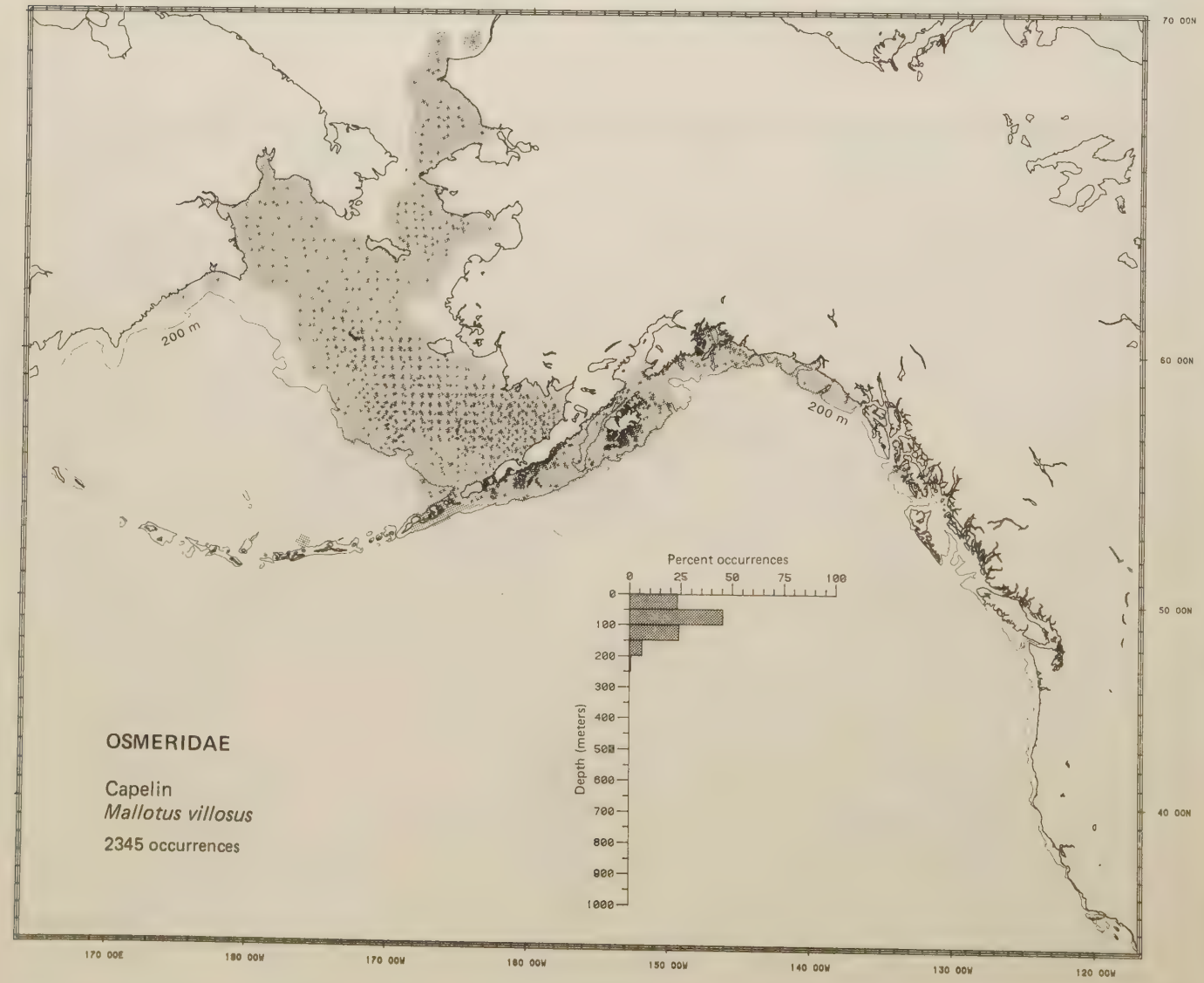


Literature Reported from Korea to the Juan de Fuca Strait between Vancouver Island and Washington in the North Pacific (Eschmeyer and Herald 1983). Range extends from the Bering Sea throughout the Arctic (Muus 1974) except off eastern Siberia (Hart 1973). Occurs in the Aleutians as far west as Attu Island (Wilimovsky 1964); in the North Atlantic, extends south to Maine, southern Greenland, Iceland, and Denmark (Leim and Scott 1966; Wheeler 1969, 1978). A pelagic species reported from the surface to 200 m, and oceanic in the Barents Sea (Andriyashev 1954; Wheeler 1978).

Survey data Found from Cape Nizkiy on the Korak Coast (northeast of Cape Olyutorski) north throughout the Anadyr Gulf in the western Bering Sea and northeast of Cape Lisburne in the Chukchi Sea south throughout the eastern Bering Sea. Taken near Great Sitkin Island in the Aleutian Islands and from there east to Prince of Wales Island in southeastern Alaska. Depth range 25 to 725 m, most frequently (45.2% of occurrences) on the middle shelf between 50 and 100 m, and 98.5% of occurrences from depths <200 m. Survey data do not extend the known geographic range, although they do provide a new maximum depth (725 m). However, this depth is about 250 m greater than the next greatest depth of occurrence, and it can probably be assumed that although the trawl was towed at 725 m, the capelin caught were much nearer the surface.

Conclusions

Zoogeography	Arctic-amphiboreal (circumboreal Atlantic northern boreal Pacific)
Life zone	Neritic-epipelagic (neritic)
Range	Throughout the Arctic south to Korea and the Juan de Fuca Strait in the Pacific and to Maine and Denmark in the North Atlantic
Depth	Surface to 200 m, possibly to 725 m



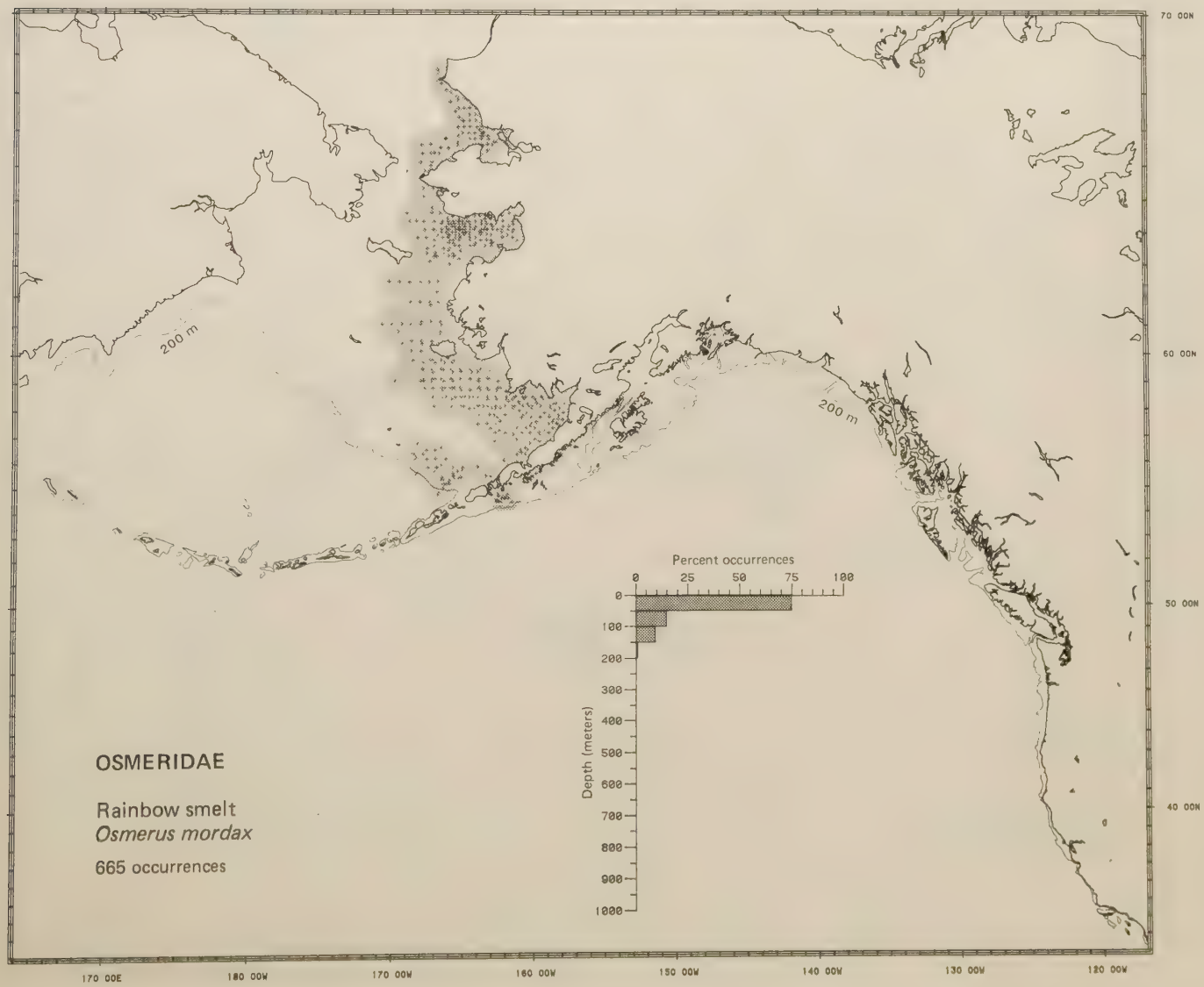
RAINBOW SMELT, *Osmerus mordax* (Mitchill 1814)

Literature Found in the North Pacific from Wonsan, North Korea, and the Sea of Okhotsk, to Barkley Sound, British Columbia, north along both the Asiatic and American coasts of the Bering Sea to the Arctic (Hart 1973; Lee et al. 1980). Arctic range extends west to the White Sea and east to Bathurst Inlet, Canada. North Atlantic range extends south along the American coast from Lake Melville, Labrador, to the Delaware River, Pennsylvania (and questionably to Virginia), and inland along the Saint Lawrence River to Lake Superior. The rainbow smelt is replaced on the European coast by the European smelt, *Osmerus eperlanus* Linnaeus 1758 (Lee et al. 1980). A pelagic and anadromous species, migrating up to 1000 km upstream, with some populations strictly freshwater (Lee et al. 1980; Morrow 1980). Reported to depths of 120 m (Fedorov 1973a).

Survey data Found from Cape Lisburne in the Chukchi Sea south along the Alaska coast of the Bering Sea to Unalaska Island and east to eastern Kodiak Island, Alaska. Depth range 25 to 425 m, most frequently (74.7% of occurrences) on the inner shelf between 0 and 50 m, and 98.6% of occurrences from depths ⩽150 m. Survey data were taken within the known geographic range. However, the data extend the maximum known depth to 425 m. Because the species is pelagic and trawls were demersal, the species may have been taken near the surface during deep tows.

Conclusions

Zoogeography	Arctic-amphiboreal (western boreal Atlantic-northern boreal Pacific)
Life zone	Fluvial-neritic (neritic)
Range	From Wonsan, North Korea, and Barkley Sound, British Columbia, to the Arctic as far as the White Sea and Bathurst Inlet, Canada, and from Lake Melville, Labrador, to the Delaware River, Pennsylvania (and questionably to Virginia), in the North Atlantic; up to 1000 km upstream in rivers
Depth	Surface to at least 150 m, possibly 425 m

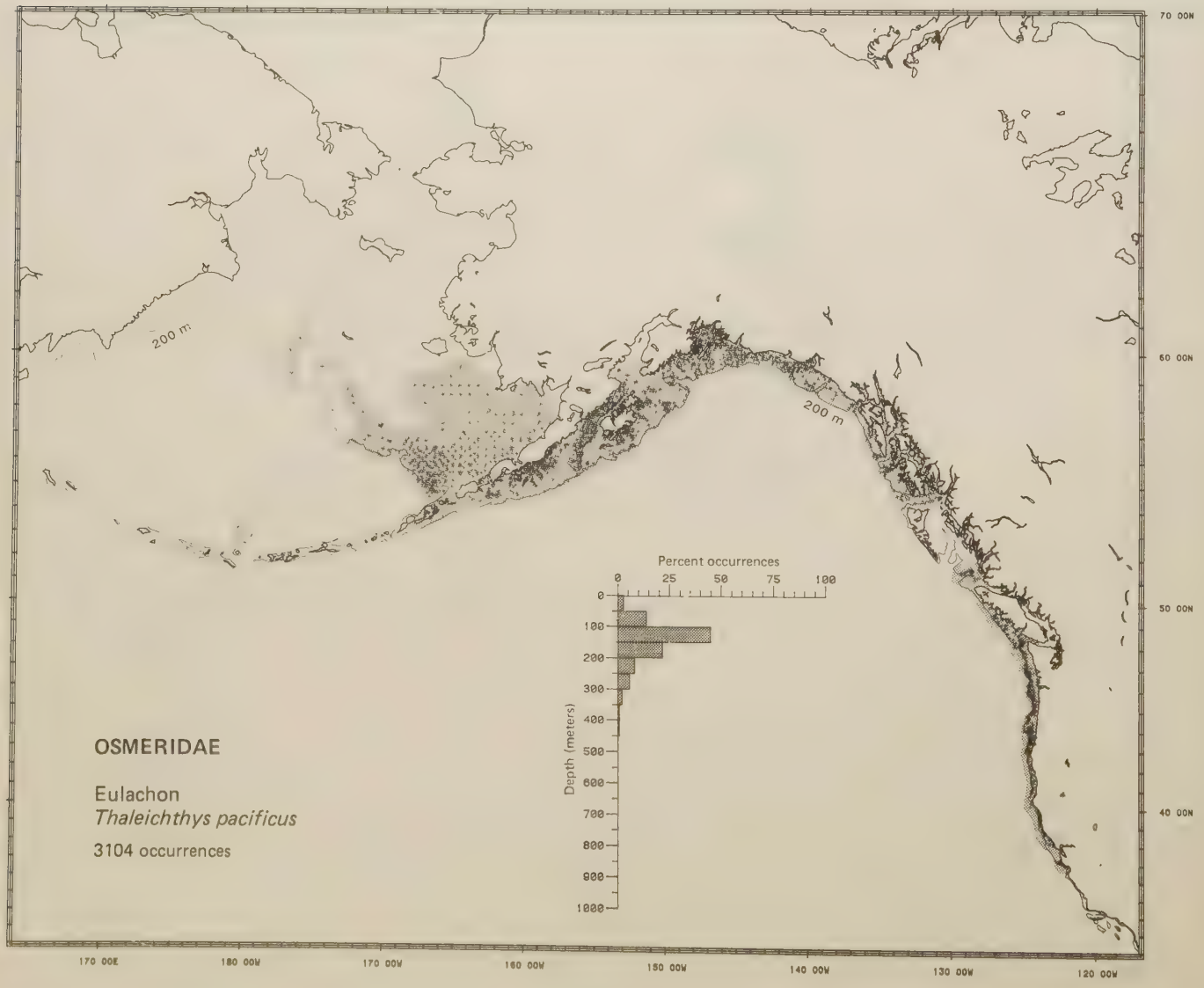


Literature Reported from the Pribilof Islands and Nushagak River, Alaska, in the Bering Sea and along the Aleutians south to Monterey Bay, California (Lee et al. 1980; Eschmeyer and Herald 1983). A pelagic and anadromous species, migrating up to 160 km upstream (Morrow 1980), and reported to 31 m in depth (Howe 1981).

Survey data Taken from west of Saint Matthew Island and off Kuskokwim Bay in the eastern Bering Sea to Bowers Bank in the Aleutian Islands and south to Monterey Bay, California. Depth range 25 to 625 m, most frequently (44.7% of occurrences) on the outer shelf between 100 and 150 m, and 96.4% of occurrences from depths ⩽300 m. Survey data extend the northwestern limit of the known range along the Alaskan mainland, in the Bering Sea, and along the Aleutian Islands, and extend its maximum known depth by almost 600 m. Because this species is pelagic, it may have been captured near the surface by trawls that were towed at greater depths; hence, the 625-m maximum depth given here may greatly overestimate its true maximum depth.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Fluvial-oceanic (neritic)
Range	From west of Saint Matthew Island and Kuskokwim Bay in the Bering Sea, and Bowers Bank in the Aleutian Islands to Monterey Bay, California, and to 160 km upstream
Depth	Surface to about 300 m, possibly 625 m



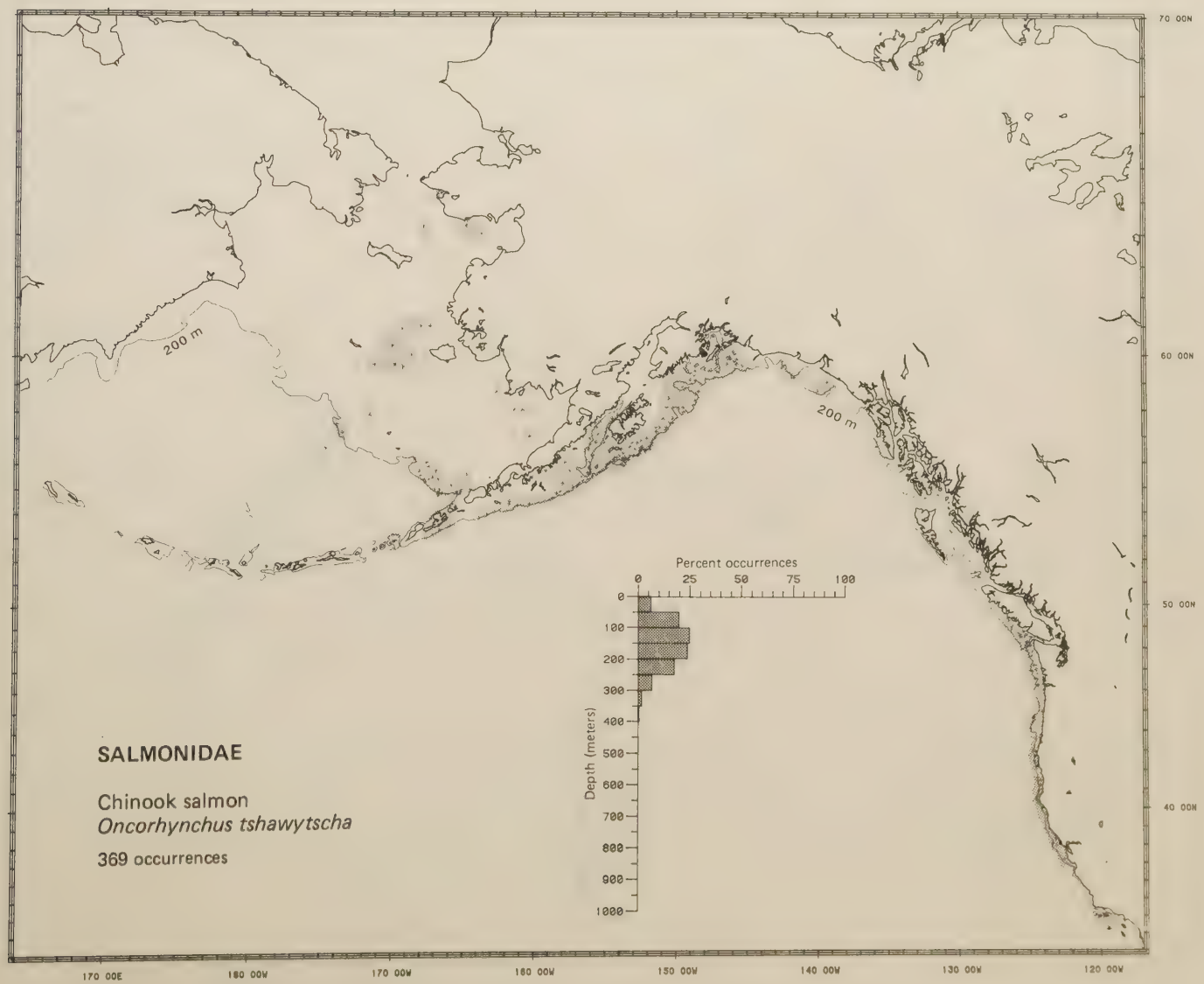
CHINOOK SALMON, *Oncorhynchus tshawytscha* (Walbaum 1792)

Literature Reported from the Arctic Ocean to northeastern Honshu, Japan, and San Diego, California (Fredin et al. 1977; Eschmeyer and Herald 1983). Range extends south in midocean to about lat. 40°N (Hubbs 1946; Hart 1973; Major et al. 1978), north to the Anadyr River in the western Bering Sea and east to the Coppermine River, Canada, in the Arctic (Hart 1973); also successfully introduced into New Zealand waters (Lee et al. 1980). Anadromous, migrating to 4827 km upstream (Browning 1980) and found to 200 m in depth in the ocean (Fedorov 1973a).

Survey data Found from Port Clarence, Alaska, Zhemchug Canyon on the eastern Bering Sea slope, and the Islands of the Four Mountains in the Aleutian Islands south to Santa Cruz, California. Depth range 25 to 375 m, most frequently (24.7% of occurrences) on the outer shelf between 100 and 150 m, and 97.8% of occurrences from depths <300 m. Survey data are within known geographic range, but extend maximum known depth to 375 m. Because this is a pelagic species generally found at depths of less than 128 m (Major et al. 1978), the fish were probably taken near the surface over deeper water.

Conclusions

Zoogeography	Primarily Arctic-oceanic and northeastern boreal Pacific
Life zone	Fluvial-oceanic (neritic)
Range	From the Coppermine River in Arctic Canada to northeastern Honshu, Japan; also found from San Diego, California, and lat. 40°N in midocean, and introduced into New Zealand waters; migrates up to 4827 km upstream in rivers
Depth	Surface to at least 200 m, possibly up to 375 m

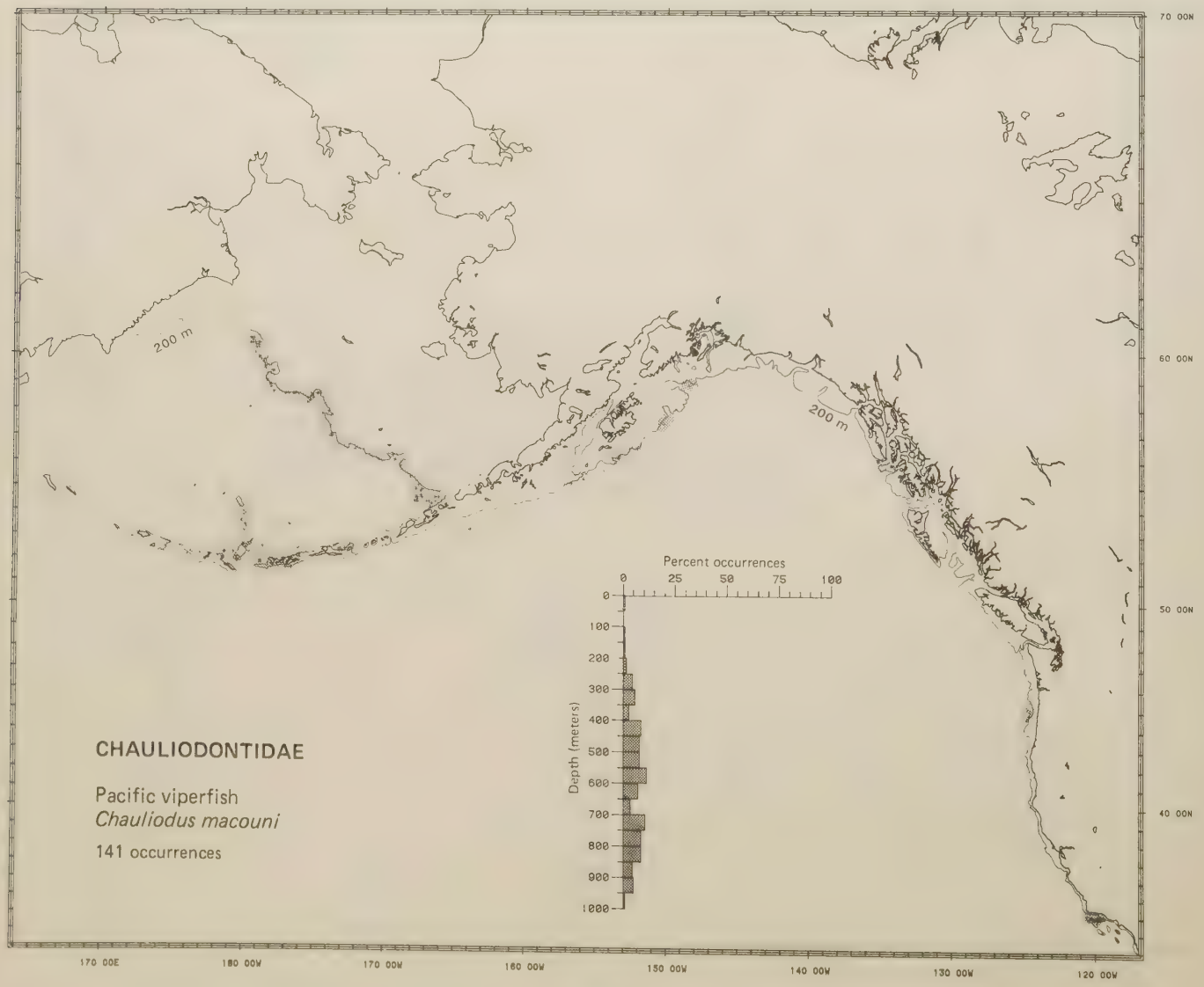


Literature A pelagic species that has been reported in the North Pacific, from the Bering Sea to Japan and central Baja California, and in the Gulf of California (Hart 1973; Howe 1981; Eschmeyer and Herald 1983), at 76 to 4231 m (Fedorov 1973a).

Survey data Found from Navarin Canyon on the northwest slope of the eastern Bering Sea and Agattu Island in the Aleutian Islands discontinuously to the Santa Barbara Channel, California. Depth range 25 to 975 m, with 11.3% of occurrences above the bathybenthal slope between 550 and 600 m, and 95.8% at depths >250 m. Survey data provide a more specific northern limit and a shallower depth limit. The Pacific viperfish is a mesopelagic species and hence was captured primarily along the slope. The distribution found in the survey data reflects that of demersal trawl tows rather than necessarily that of the species. Only a few mesopelagic midwater tows were taken over the Aleutian and North Pacific Basins.

Conclusions

Zoogeography	Oceanic boreal Pacific
Life zone	Mesopelagic
Range	From Navarin Canyon in the Bering Sea to Japan, central Baja California, and the Gulf of California
Depth	25 to 4231 m (see note above)



GIANT GRENADIER, *Albatrossia pectoralis* (Gilbert 1892)

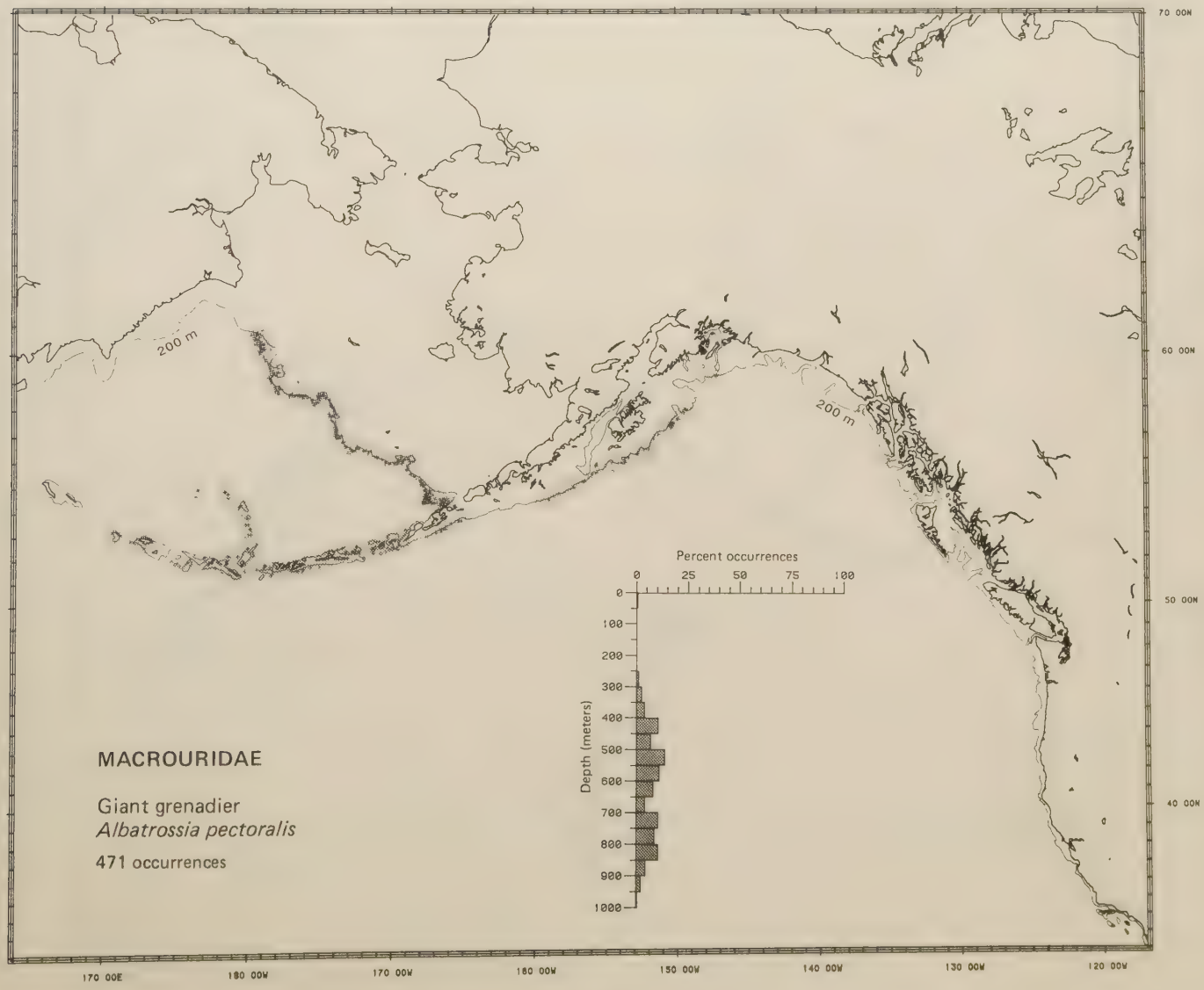
Taxonomic comment Although the giant grenadier is *Coryphaenoides pectoralis* in the most recent revision of the Macrouridae of the northeastern Pacific (i.e., Iwamoto and Stein 1974), it is placed in the genus *Albatrossia* in Eschmeyer and Herald (1983), based upon the present opinion of T. Iwamoto (Dep. Ichthyology, Calif. Acad. Sci., San Francisco, CA 94118, pers. commun. March 1986).

Literature Reported from northern Honshu, Japan, to the Bering Sea and south to northern Baja California (Quast and Hall 1972; T. Iwamoto, pers. commun. March 1986), at depths from 200 to 2189 m (Iwamoto and Stein 1974; Howe 1981).

Survey data Found from Navarin Canyon on the northwestern slope of the eastern Bering Sea and Stalemate Bank and the Ulm Plateau in the Aleutian Islands to Christian Sound, southeastern Alaska. Depth range 25 to 1025 m, most frequently (13.6% of occurrences) on the slope between 500 and 550 m, and 94.9% of occurrences from depths of 300 to 900 m. Although the survey data provide a new shallow record, it is clear that this species occurs primarily in deep water along the slope.

Conclusions

Zoogeography	Northeastern boreal Pacific
Life zone	Mesobenthal-bathybenthal (bathybenthal)
Range	From northern Honshu, Japan, to Navarin Canyon in the Bering Sea and south to northern Baja California
Depth	200 to 2189 m, although generally below 300 m; possibly as shallow as 25 m



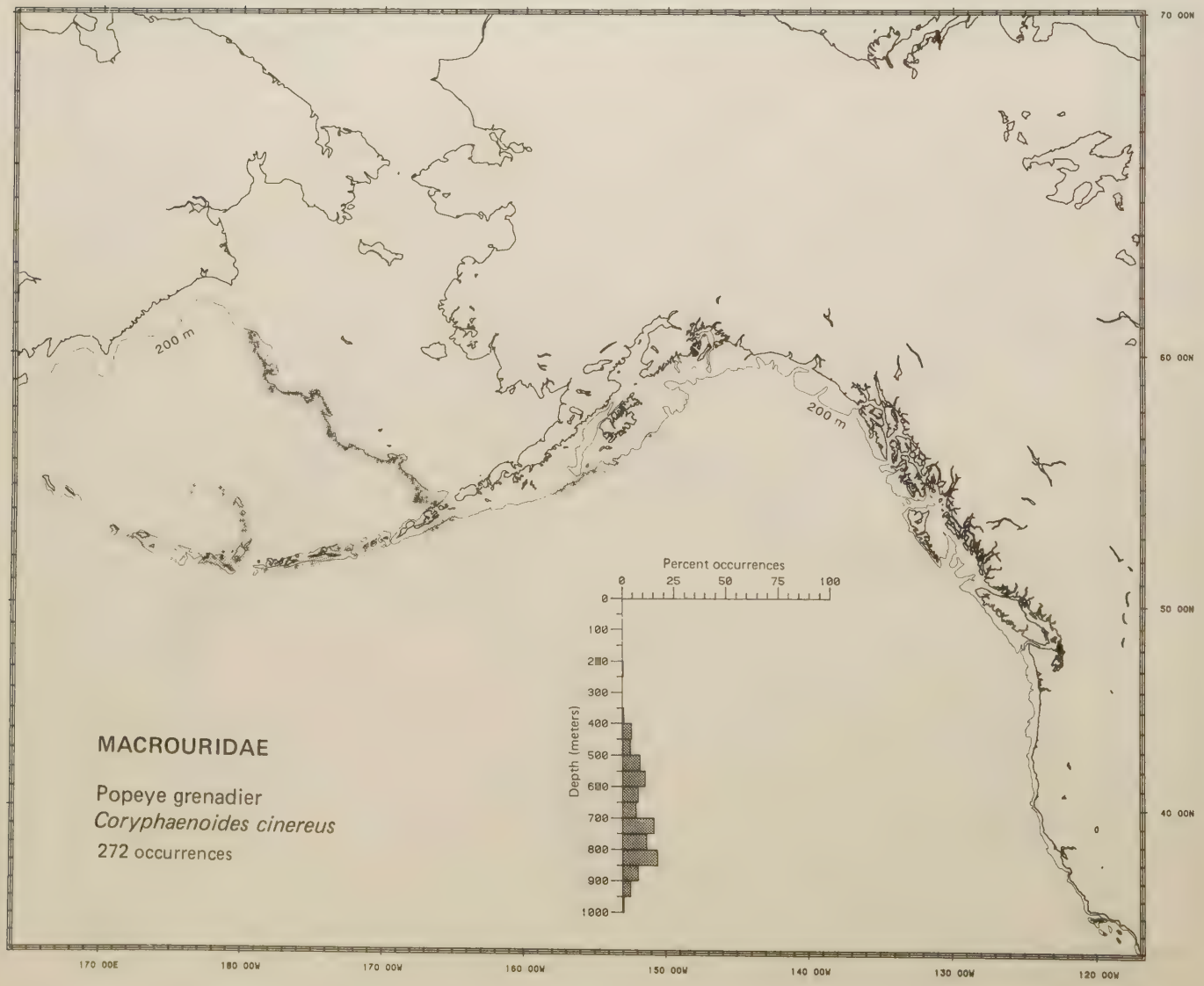
POPEYE GRENADIER, *Coryphaenoides cinereus* (Gilbert 1896)

Literature Reported from northern Honshu, Japan, and the Sea of Okhotsk to the Bering Sea to Oregon (Iwamoto and Stein 1974; Howe 1981; T. Iwamoto, Dep. Ichthyology, Calif. Acad. Sci., San Francisco, CA 94118, pers. commun. March 1986), at depths from 300 to 2832 m (Fedorov 1973a; Howe 1981).

Survey data Found from Navarin Canyon on the northwestern slope of the eastern Bering Sea and Stalemate Bank and the Ulm Plateau in the Aleutian Islands to Kodiak Island, Alaska. Depth range 225 to 1025 m, most frequently (16.9% of occurrences) on the bathybenthal slope between 800 and 850 m, and 97.8% of occurrences from depths of 400 to 950 m. Survey data provide a more precise northermost limit in the Bering Sea and distribution in the Aleutian Islands, and a new shallow depth record.

Conclusions

Zoogeography	Northeastern boreal Pacific
Life zone	Mesobenthal-bathybenthal (bathybenthal)
Range	From northern Honshu, Japan, and the Sea of Okhotsk to Navarin Canyon in the Bering Sea to Oregon
Depth	225 to 2832 m



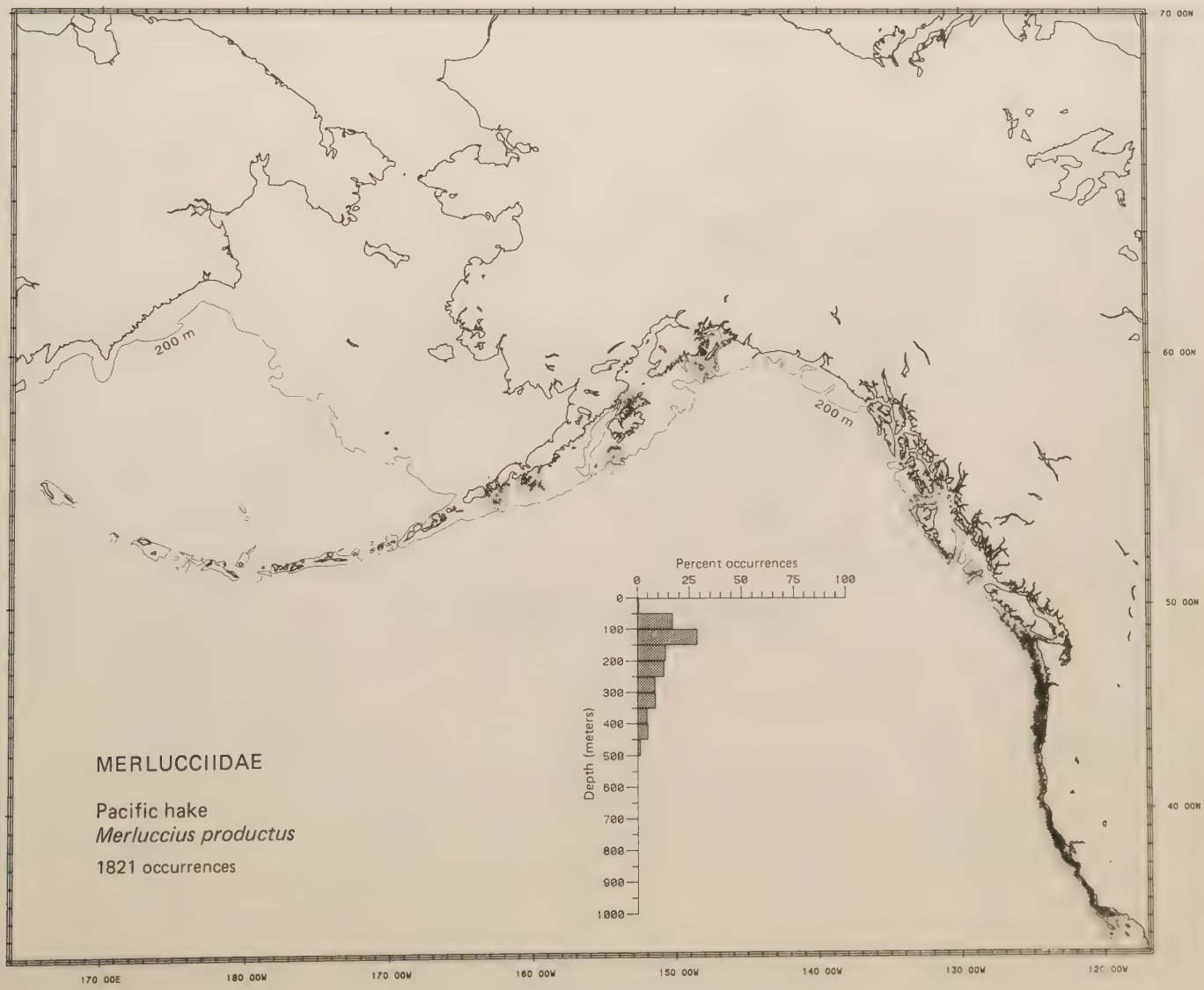
PACIFIC HAKE, *Merluccius productus* (Ayres 1855)

Literature A pelagic species reported from the Bering Sea to Magdalena Bay, Baja California Sur (Frey 1971; Fedorov 1973a; Eschmeyer and Herald 1983). Reports of its occurrence in the Gulf of California (Eschmeyer and Herald 1983) are in error (J. Arvizu, Centro Interdisciplinario de Ciencias Marinas, La Paz, Baja Calif. Sur, Mexico, pers. commun. October 1986). Miller and Lea (1972) and Eschmeyer and Herald (1983) noted that it occurred on the Asiatic coast, but Svetovidov (1948) had previously discounted this occurrence (at Dekastries Bay, U.S.S.R., in the Tatar Strait) as unlikely. Depths range from 0 to 914 m, but generally occurs at depths >229 m (Miller and Lea 1972; Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Sanak Island (southeast of Unimak Island in the Gulf of Alaska) to the Patton Escarpment off southern California. Depth range 25 to 575 m, with 28.6% of occurrences on the outer shelf between 100 and 150 m, and 97.9% of occurrences from depths between 50 and 500 m.

Conclusions

Zoogeography	Eastern temperate Pacific
Life zone	Neritic-mesopelagic (neritic)
Range	From the Bering Sea to Magdalena Bay, Baja California Sur
Depth	0 to 914 m



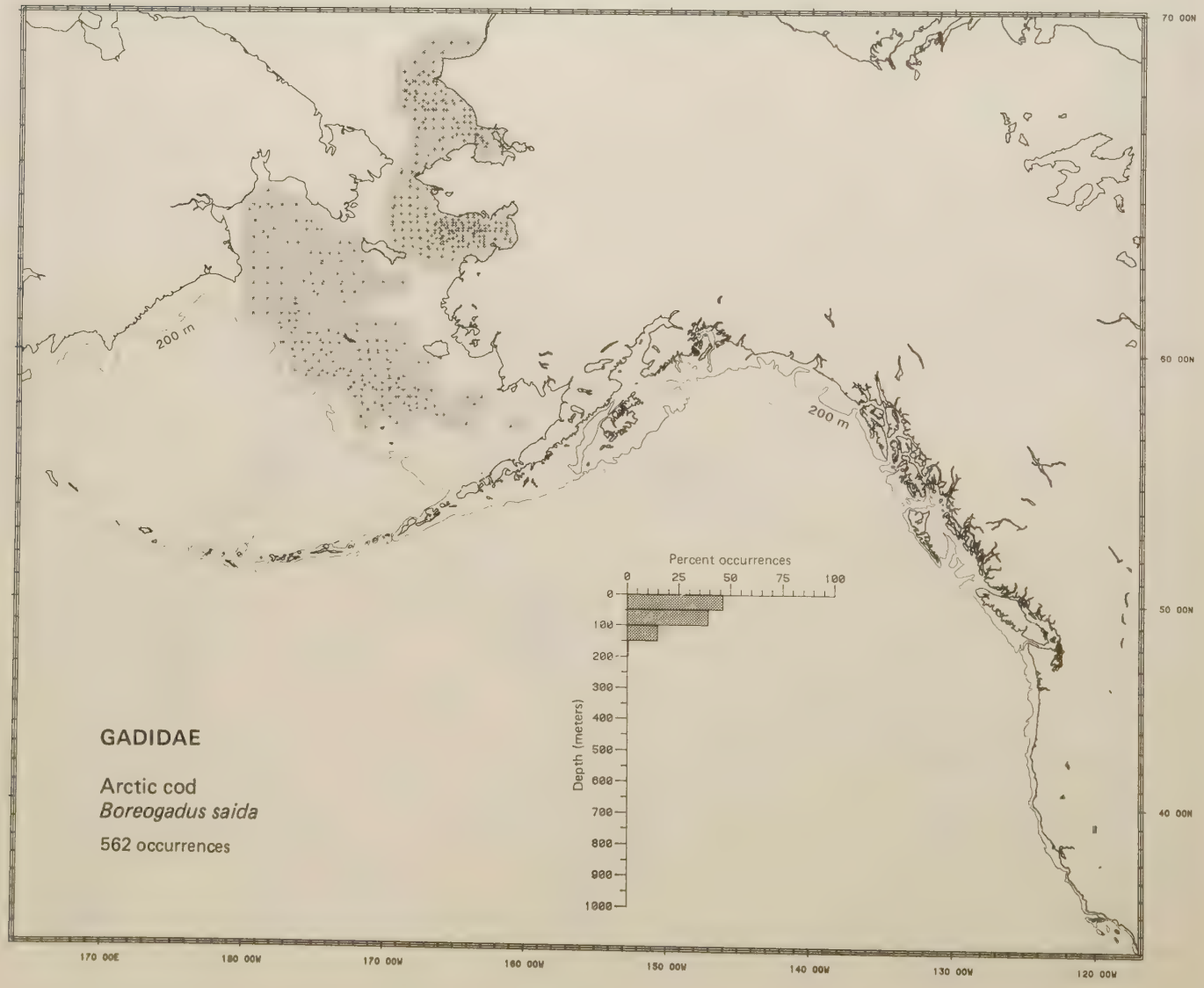
ARCTIC COD, *Boreogadus saida* (Lepechin 1774)

Literature Circumpolar in the Arctic Ocean and reported from near the North Pole to Cape Olyutorski and Norton Sound in the Bering Sea and to the Miramichi River, New Brunswick, the southern tip of Greenland, northern Iceland, and the White Sea in the Atlantic and European Arctic (McKenzie 1953; Andriyashev 1954; Quast and Hall 1972; Muus 1974). A pelagic species found upstream in rivers and, in the ocean, to 731 m (Leim and Scott 1966; Morrow 1980) in depth.

Survey data Found from northeast of Cape Lisburne in the Chukchi Sea south in the eastern Bering Sea to Cape Navarin, the Pribilof Islands, and Bristol Bay. Depth range 25 to 175 m, with 46.1% of occurrences on the inner shelf between 0 and 50 m, and 99.6% from depths <150 m. Survey data extend the southernmost limit of the known range in the eastern Bering Sea to the Pribilof Islands and Bristol Bay.

Conclusions

Zoogeography	Arctic
Life zone	Neritic-epipelagic (neritic)
Range	Throughout the Arctic to the White Sea, Iceland, and southern Greenland, in the western Atlantic into the Miramichi River, New Brunswick, and in the Bering Sea to Cape Olyutorski, the Pribilof Islands, and Bristol Bay
Depth	Surface to 731 m



SAFFRON COD, *Eleginus gracilis* (Tilesius 1810)

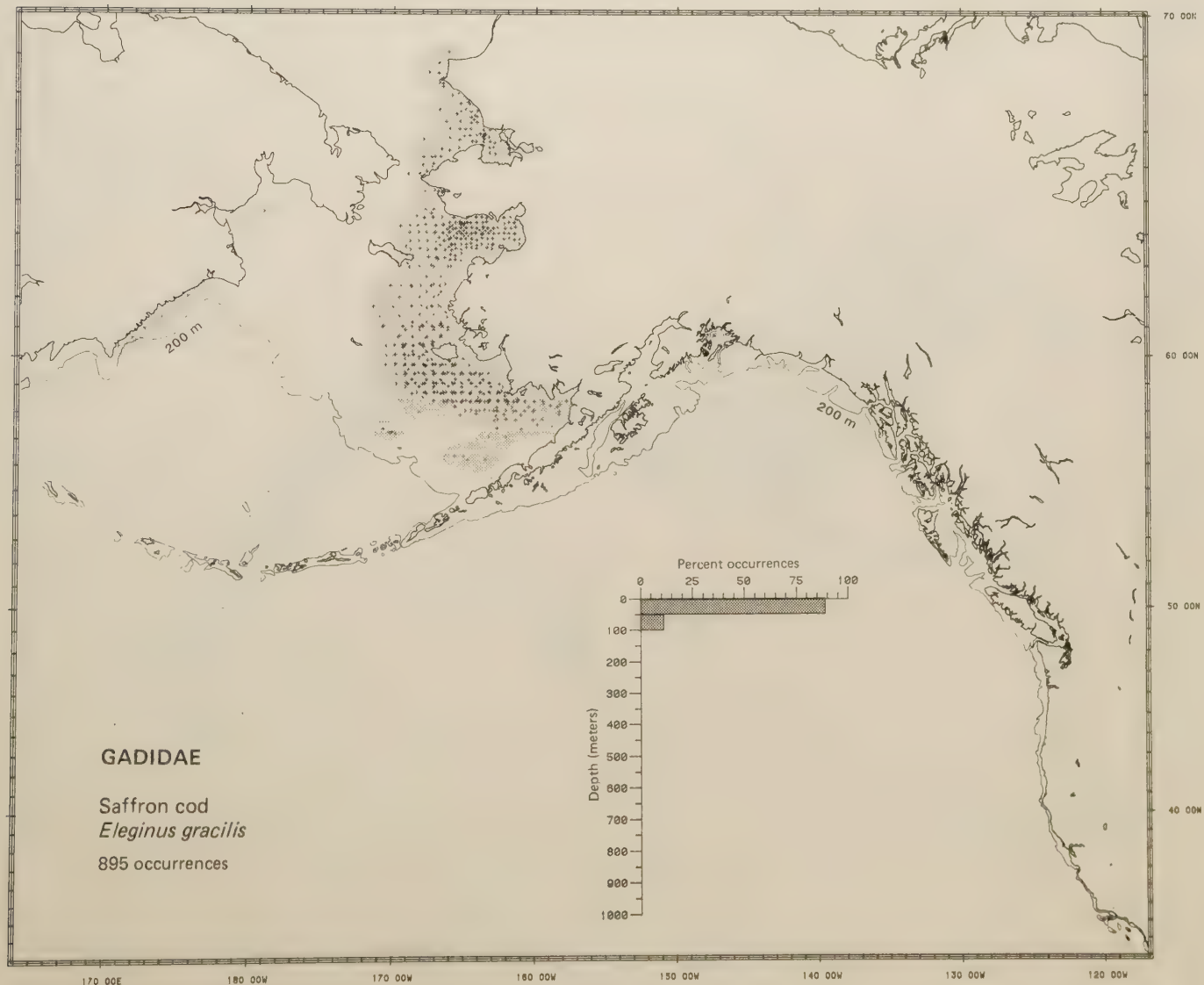
Gadidae: Cods

Literature Reported from Chemulpo, North Korea, in the Yellow Sea to Kotzebue Sound in the Chukchi Sea; south in the Aleutian Islands to Unalaska Island; and east to Sitka, Alaska (Svetovidov 1948; Andriyashev 1954; Wilimovsky 1964). Found at least 10 km up rivers (but within tidal influence) and to 60 m deep in the ocean (Svetovidov 1948; Howe 1981).

Survey data Found from Cape Olyutorski in the western Bering Sea and from southern Bristol Bay in the eastern Bering Sea to Cape Lisburne in the Chukchi Sea. Depth range 25 to 75 m, most frequently (88.9% of occurrences) on the inner shelf at depths <50 m and occurred only at depths <75 m. Survey data extend known range slightly to the north and provide a new maximum depth record. The species has seldom been taken in the Gulf of Alaska.

Conclusions

Zoogeography	Arctic-northwestern boreal Pacific
Life zone	Inner shelf
Range	From Cape Lisburne in the Chukchi Sea to Chemulpo, North Korea, in the Yellow Sea and Sitka, Alaska
Depth	Surface to 75 m

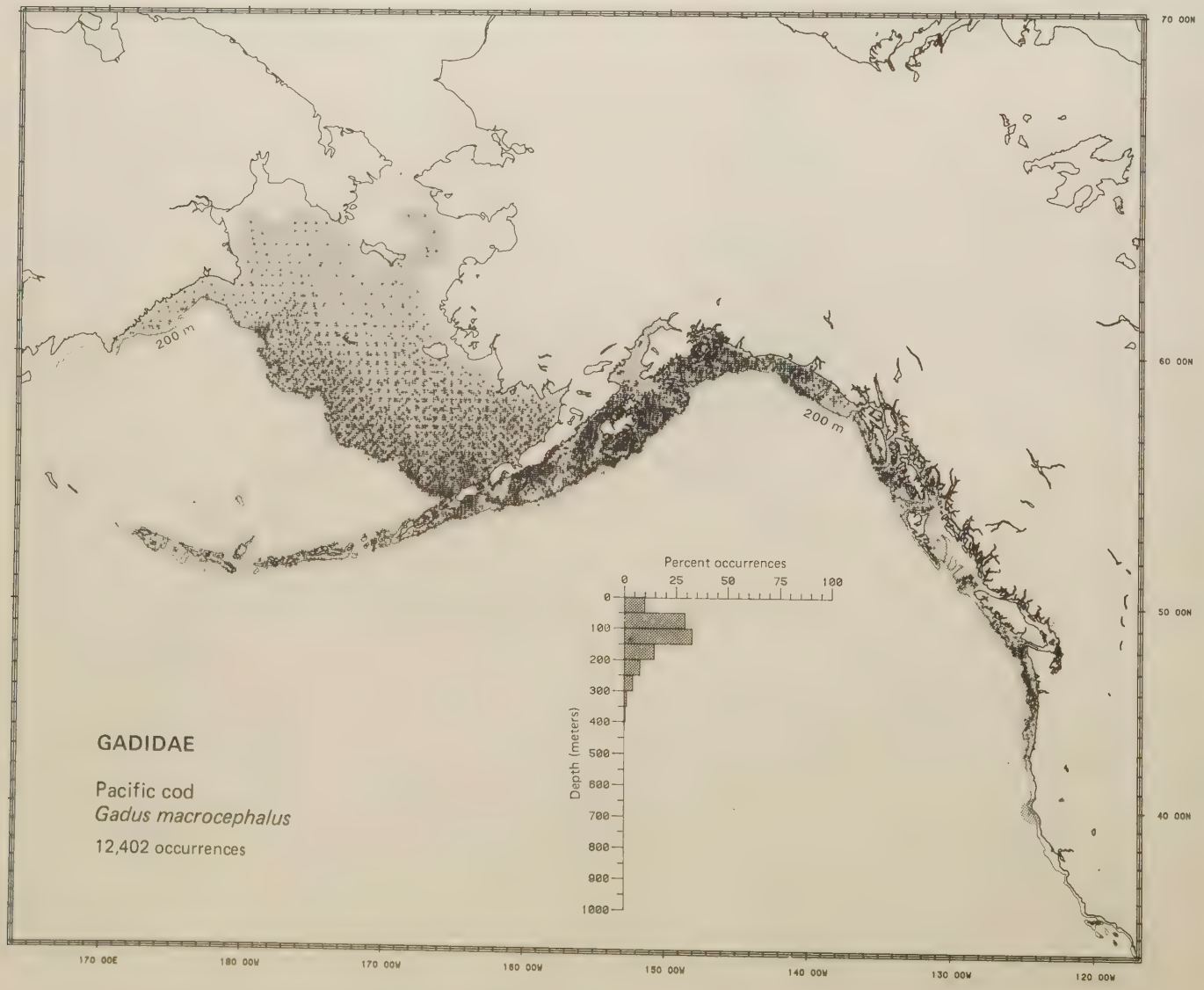


Literature Reported from Lushun (Port Arthur), Manchuria, China, in the Yellow Sea to the Bering Strait, along the Commander and Aleutian Islands, and from there to Santa Monica, California (Andriyashev 1954; Okada and Kobayashi 1968; Hart 1973; Eschmeyer and Herald 1983), at 0 to 675 m in depth (Fedorov 1973a; Howe 1981).

Survey data Found from Cape Olyutorski and Medny Seamount in the western Bering Sea to off Cape Rodney in the northern Bering Sea, throughout the eastern Bering Sea, along the Aleutian Islands to Attu Island, and from the Alaska Peninsula to Cape Mendocino, California. Depth range 25 to 875 m, most frequently (32.4% of occurrences) on the outer shelf from 100 to 150 m, and 97.8% of occurrences from depths <300 m. Survey data provide a new maximum depth record.

Conclusions

Zoogeography	Circumboreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From Lushun, Manchuria, China, to the Bering Strait, along the Commander and Aleutian Islands, and from there to Santa Monica, California
Depth	0 to 875 m



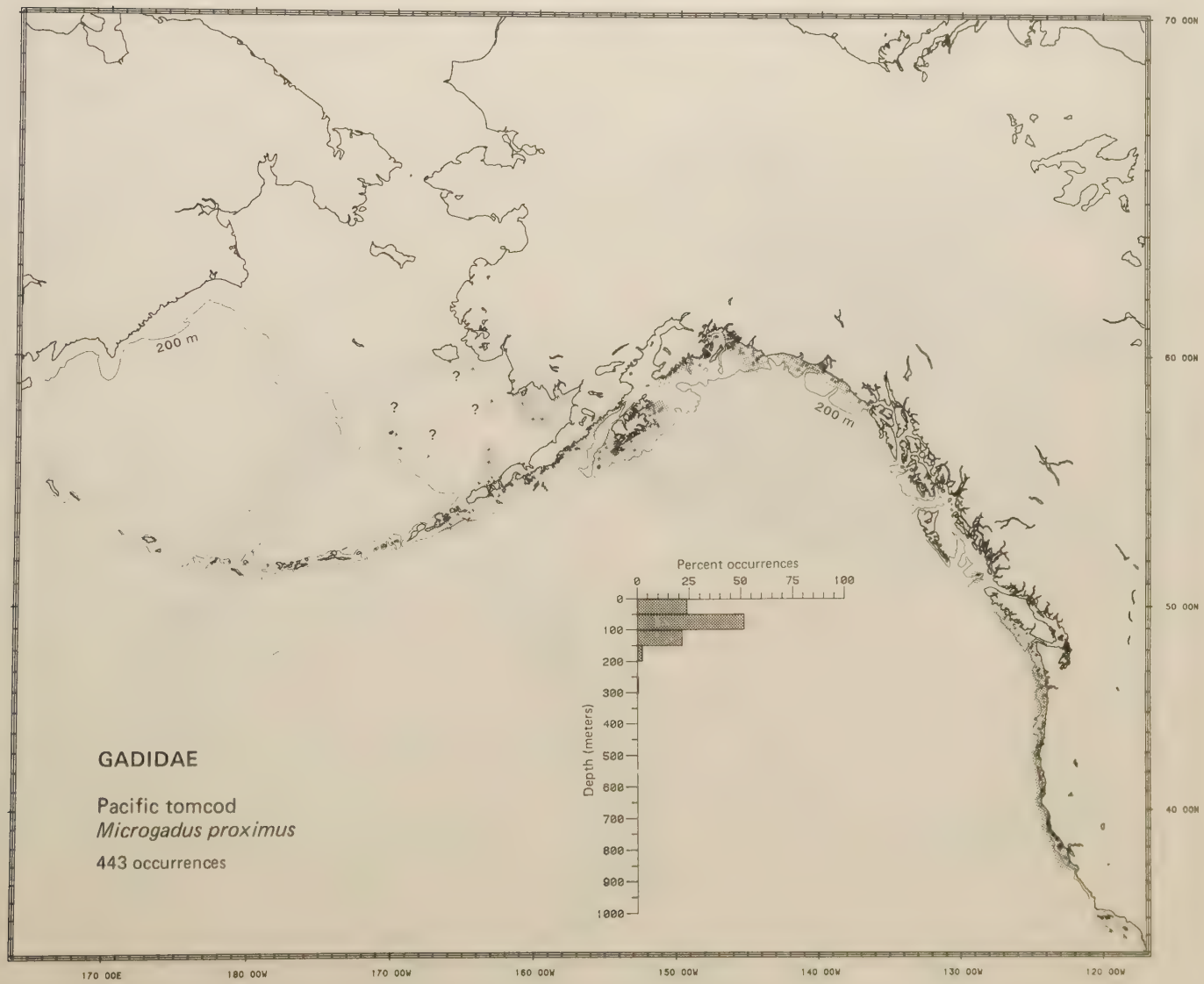
PACIFIC TOMCOD, *Microgadus proximus* (Girard 1854)

Literature Reported from the Bering Sea and Unalaska Island to Point Sal, California (Miller and Lea 1972; Hart 1973). Occurs in estuaries to the Mesohaline Zone and has been taken from 0 to 260 m in depth (Hart 1973; Eschmeyer and Herald 1983; Simenstad 1983).

Survey data Found from off Kuskokwim Bay and the Pribilof Islands in the southeastern Bering Sea and Unalaska Island in the Aleutian Islands to Monterey Bay, California. Depth range 25 to 275 m, most frequently (51.5% of occurrences) on the middle shelf between 50 and 100 m, and 96.8% of occurrences from depths <150 m. Survey data provide a slightly greater maximum depth and better define the distribution of the species in the Bering Sea. However, some records in the southeastern Bering Sea may actually be of the morphologically-similar saffron cod, *Eleginus gracilis* (J. R. Dunn, Northwest Alaska Fish., Cent., Natl. Mar. Fish. Serv., NOAA, Seattle, WA 98115, pers. commun. March 1986).

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Kuskokwim Bay, the Pribilof Islands, and Unalaska Island in the Bering Sea to Point Sal, California
Depth	0 to 275 m



WALLEYE POLLOCK, *Theragra chalcogramma* (Pallas [1814])

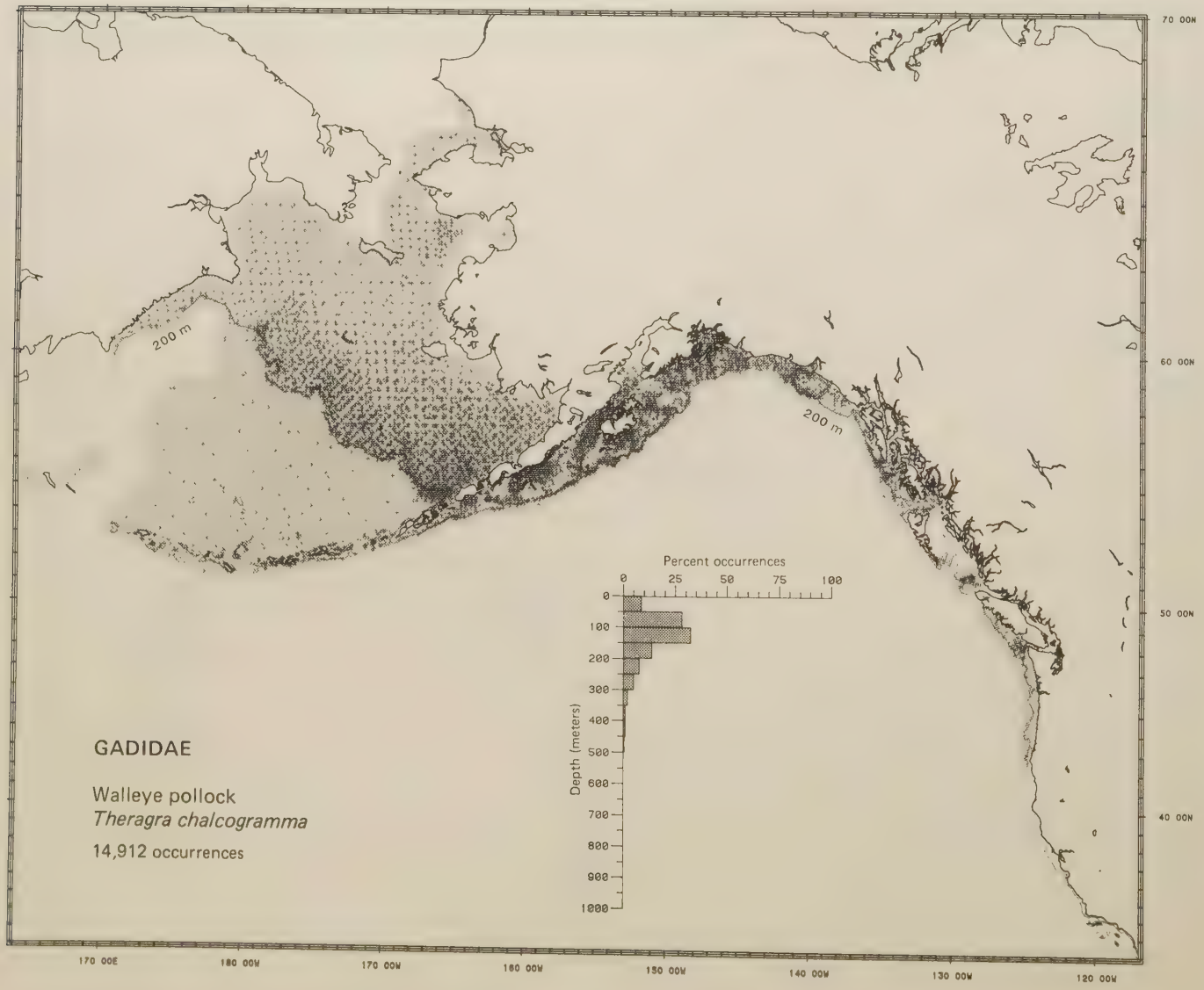
Gadidae: Cods

Literature Reported from the southern Sea of Japan to the Chukchi Sea, along the Aleutian Islands to Amchitka Island and south to Carmel, California (Wilimovsky 1964; Hart 1973; Wolotira et al. 1977), from 0 to 750 m (Hart 1973; Fedorov 1973a). The occurrence of this species off northern Baja California given in Quast and Hall (1972) is apparently an error.

Survey data Found from Bering Island in the western Bering Sea to Kivalina, Alaska, in the Chukchi Sea, south throughout the Bering Sea, Aleutian Basin, and Aleutian Islands to Cape Blanco, Oregon, and in midwater hauls from across the Aleutian Basin. Depth range 25 to 975 m, most frequently (32.3% of occurrences) on the outer shelf between 100 and 150 m, and 94.8% of occurrences from depths <300 m. Survey data provide a new northernmost limit and extend the maximum known depth by 225 m. Midwater distribution across the Aleutian Basin indicates the species is pelagic.

Conclusions

Zoogeography	Arctic-circumboreal Pacific
Life zone	Neritic-mesopelagic (neritic)
Range	From Kivalina, Alaska (new northernmost limit), in the Chukchi Sea to the southern Sea of Japan and to Carmel, California
Depth	0 to 975 m



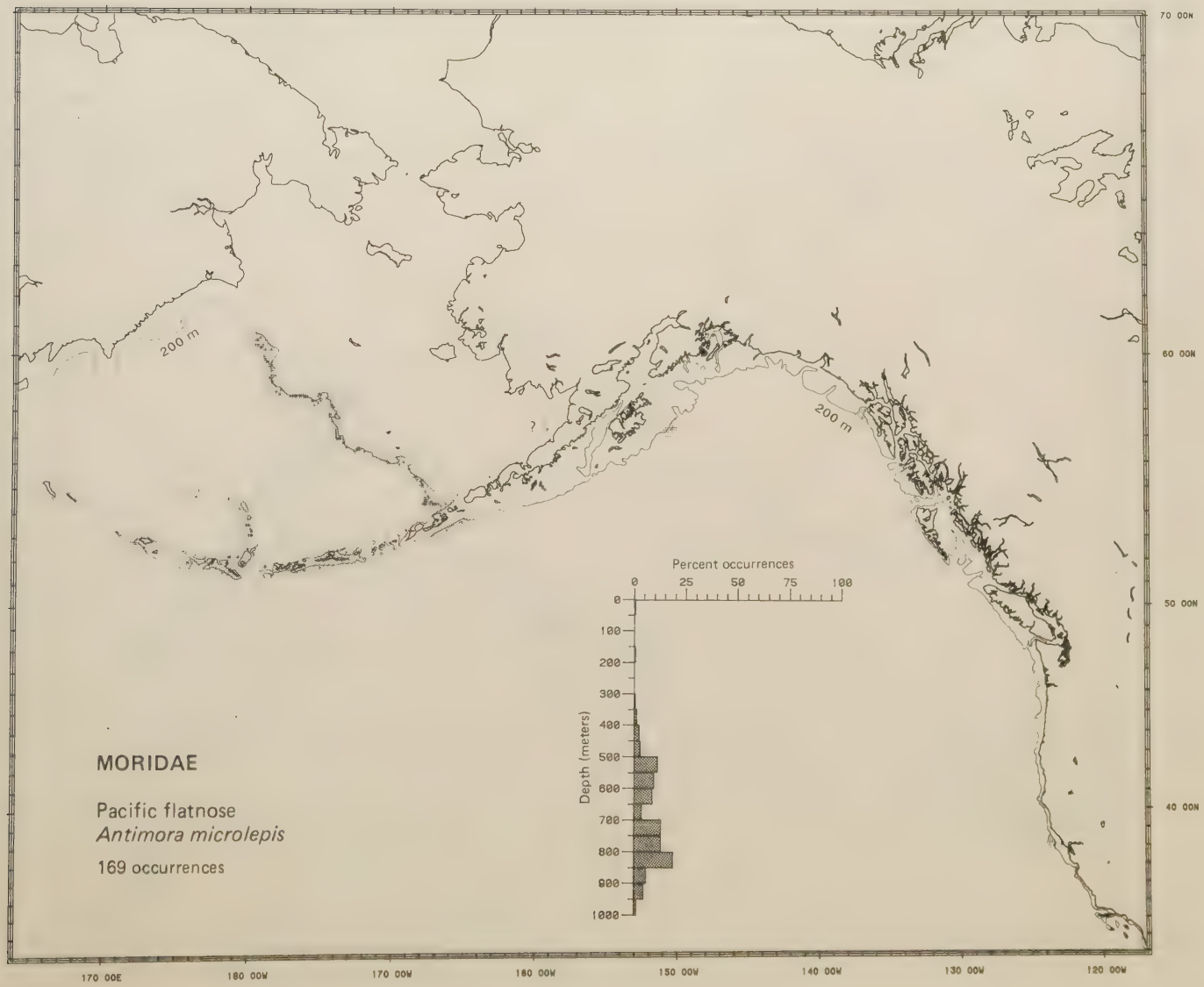
PACIFIC FLATNOSE, *Antimora microlepis* Bean 1890

Literature Reported from Shikoku Island, Japan, north to the southeastern Bering Sea, southeast to the Gulf of California, and off Johnston Island in the central North Pacific. Probably occurs throughout the Pacific north of lat. 10°N (Small 1981). Depth range from 363 to 3048 m (Miller and Lea 1972; Howe 1981).

Survey data Found from Navarin Canyon in the Bering Sea along the southeastern rim of the Aleutian Basin to Attu Island (including Bowers Bank) and discontinuously along the rim of the northeastern Pacific Basin to Point Reyes, California. Depth range 25 to 1275 m, most frequently (18.9% of occurrences) on the bathybenthal slope between 800 and 850 m, and 96.4% of occurrences at depths >350 m. Survey data define a northern limit in the Bering Sea and more completely defines distribution along the Aleutian Islands. The shallow occurrence of this species in Bristol Bay must be regarded as questionable; the next shallowest occurrence was at 175 m.

Conclusions

Zoogeography	Temperate north Pacific
Life zone	Mesobenthal-bathybenthal
Range	From Shikoku Island, Japan, to Navarin Canyon in the Bering Sea, the Gulf of California, and Johnston Island
Depth	About 175 m (possibly 25 m) to 3048 m

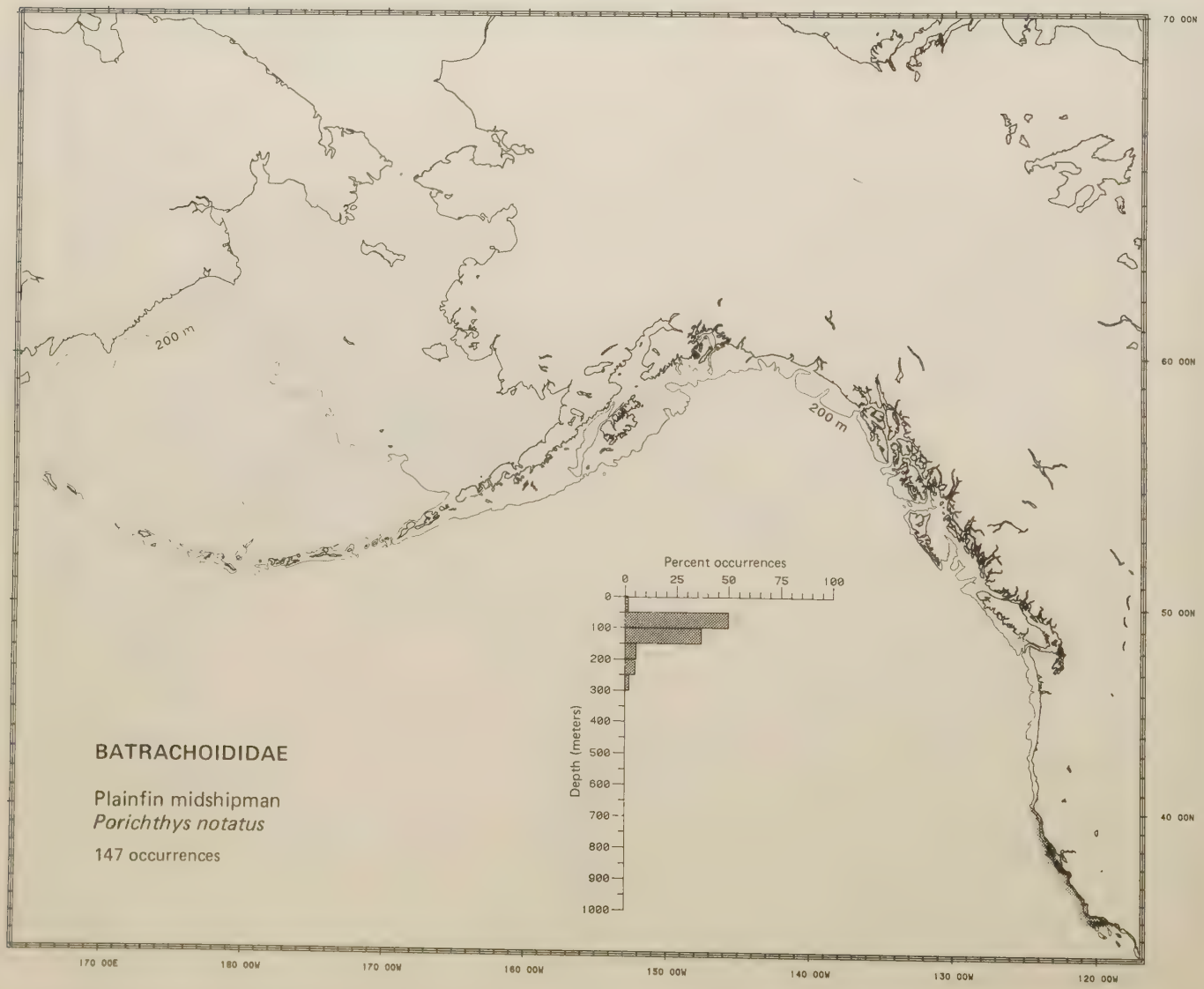


Literature Taken from Sitka, Alaska, to Magdalena Bay, Baja California Sur. Previous records south of there and in the Gulf of California are in error (Miller and Lea 1972; H. J. Walker, Scripps Inst. Oceanogr., Univ. Calif., San Diego, La Jolla, CA 92093, pers. commun. December 1986). Depth range reported from intertidal zone to 366 m (Hart 1973; Eschmeyer and Herald 1983). Commonly occurs intertidally during spawning season (at least north of Point Conception, California; Ibara 1967).

Survey data Found from Barkley Sound, Vancouver Island, British Columbia, to Santa Monica Bay, California. Depth range 25 to 275 m, most frequently (49.7% of occurrences) on the outer shelf between 100 and 150, m and 96.6% of occurrences from depths of 50 to 250 m. Survey data lie within the known geographic and depth ranges, but give a more precise depth of common occurrence.

Conclusions

Zoogeography	Oregonian-Californian
Life zone	Intertidal-mesobenthal (outer shelf)
Range	From Sitka, Alaska, to Magdalena Bay, Baja California Sur
Depth	Intertidal zone to 366 m



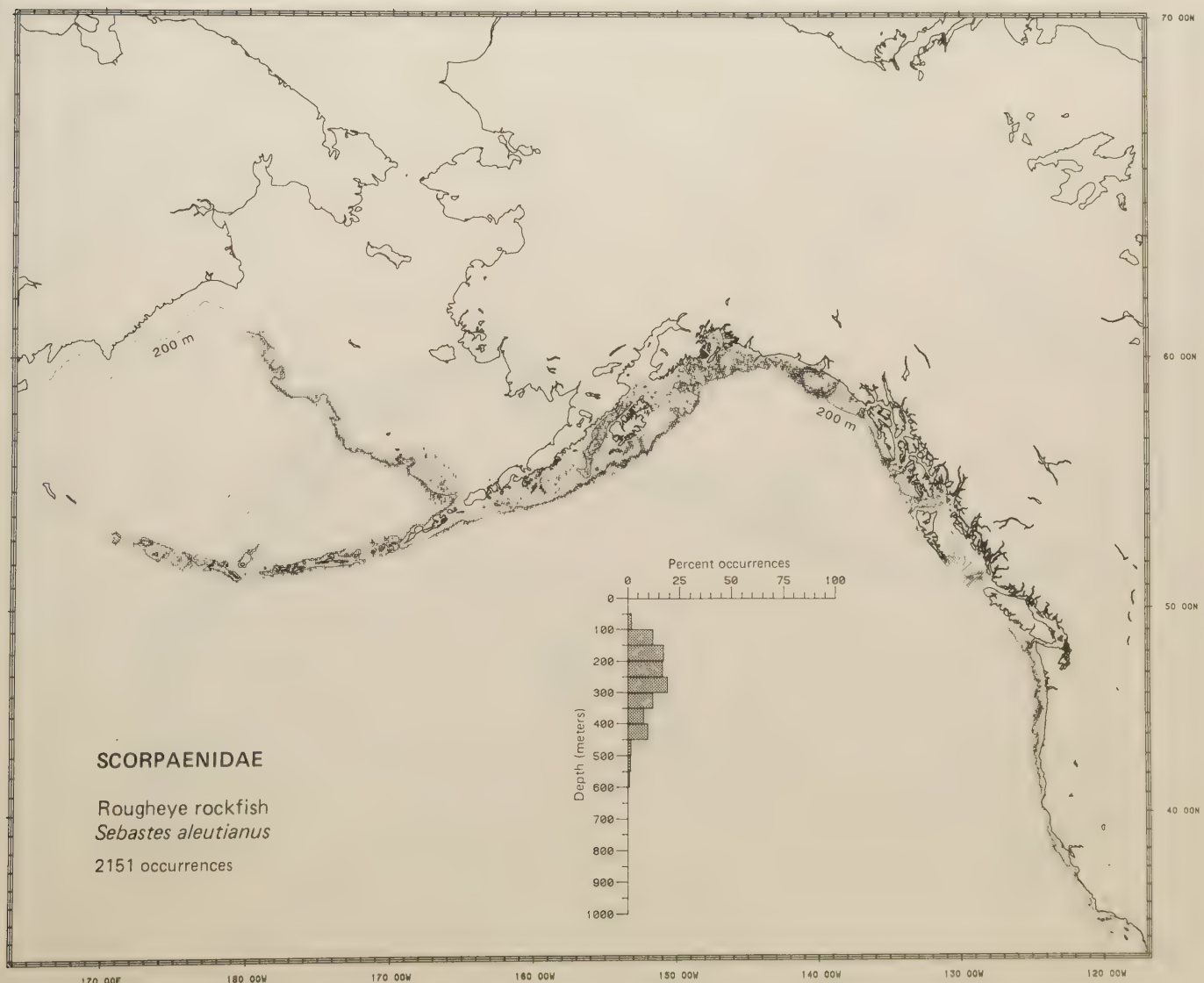
ROUGHEYE ROCKFISH, *Sebastes aleutianus* (Jordan and Evermann 1898) — Scorpaenidae: Scorpionfishes

Literature Reported from Japan to the Bering Sea (but not in the Sea of Okhotsk), west in the Aleutian Islands to Amchitka Island, and south to San Diego, California (Miller and Lea 1972; Simenstad et al. 1977; Howe 1981; Eschmeyer and Herald 1983). Reported depths from 88 to 732 m (deeper records to 2820 m were probably shortraker rockfish, *Sebastes borealis*; Fedorov 1973a; Hart 1973).

Survey data Found from Navarin Canyon on the northwestern slope of the eastern Bering Sea and Stalemate Bank and the Ulm Plateau in the Aleutian Islands to Point Sal, California. Depth range 25 to 875 m, most frequently (19.0% of occurrences) on the mesobenthal slope between 250 and 300 m, and 95.4% of occurrences from 50 to 450 m. Survey data provide a more precise description of the northernmost limit, distribution in the Aleutian Islands, and new depth limits.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (mesobenthal)
Range	From Japan to Navarin Canyon in the Bering Sea (but not in the Sea of Okhotsk), throughout the Aleutian Islands, and south to San Diego, California
Depth	25 to 875 m

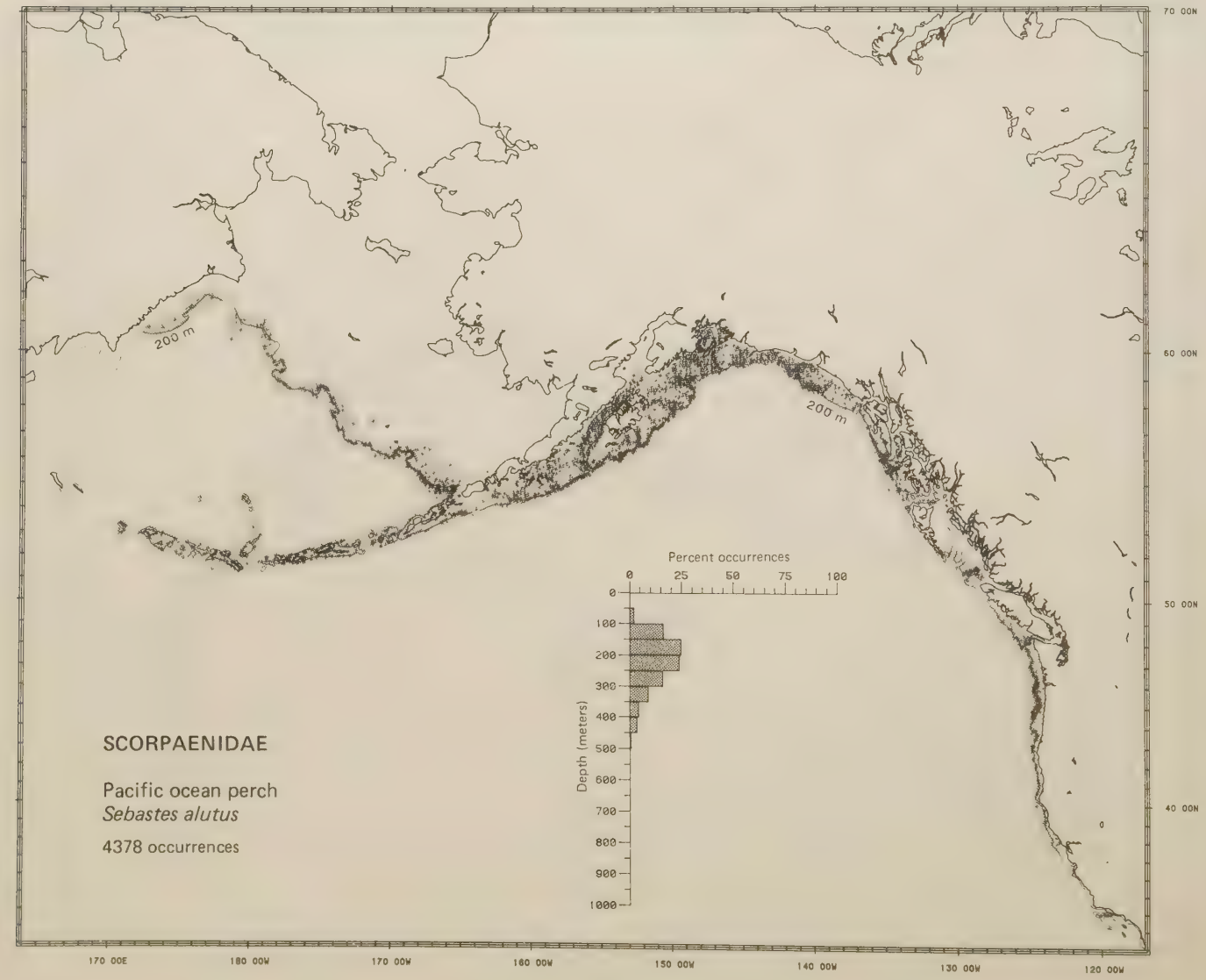


Literature Reported from north of Honshu, Japan, to Cape Olyutorski in the Bering Sea (but not in the Sea of Okhotsk), Attu Island in the Aleutians, and south to La Jolla, California (Shmidt 1950; Wilimovksy 1964; Quast and Hall 1972; Hart 1973; Eschmeyer and Herald 1983), at depths of 0 to 800 m, but generally at depths >128 m (Hart 1973; Howe 1981).

Survey data Found from off Glubokaya Bay on the Korak Coast in the western Bering Sea to south of Cape Navarin in the northern Bering Sea, along the slope of the eastern Bering Sea to Unimak Island (including Medny Seamount off the Commander Islands) and from Stalemate Bank and the Ulm Plateau in the Aleutian Islands southeast to Oxnard, California. Depth range 25 to 825 m, most frequently (24.6% of occurrences) on the outer shelf between 150 and 200 m, and 96.8% of occurrences from 100 to 450 m. Survey data provide a new northern limit for the Pacific ocean perch, as well as a more precise description of its distribution in the Aleutian Islands and a slightly greater maximum depth record.

Conclusions

Zoogeography	Kurile-Aleutian
Life zone	Outer shelf-mesobenthal (outer shelf)
Range	From Honshu, Japan, to Cape Navarin in the Bering Sea (but not in the Sea of Okhotsk) and La Jolla, California, and along the Aleutians from Stalemate Bank and Bowers Bank to the Alaska Peninsula
Depth	0 to 825 m

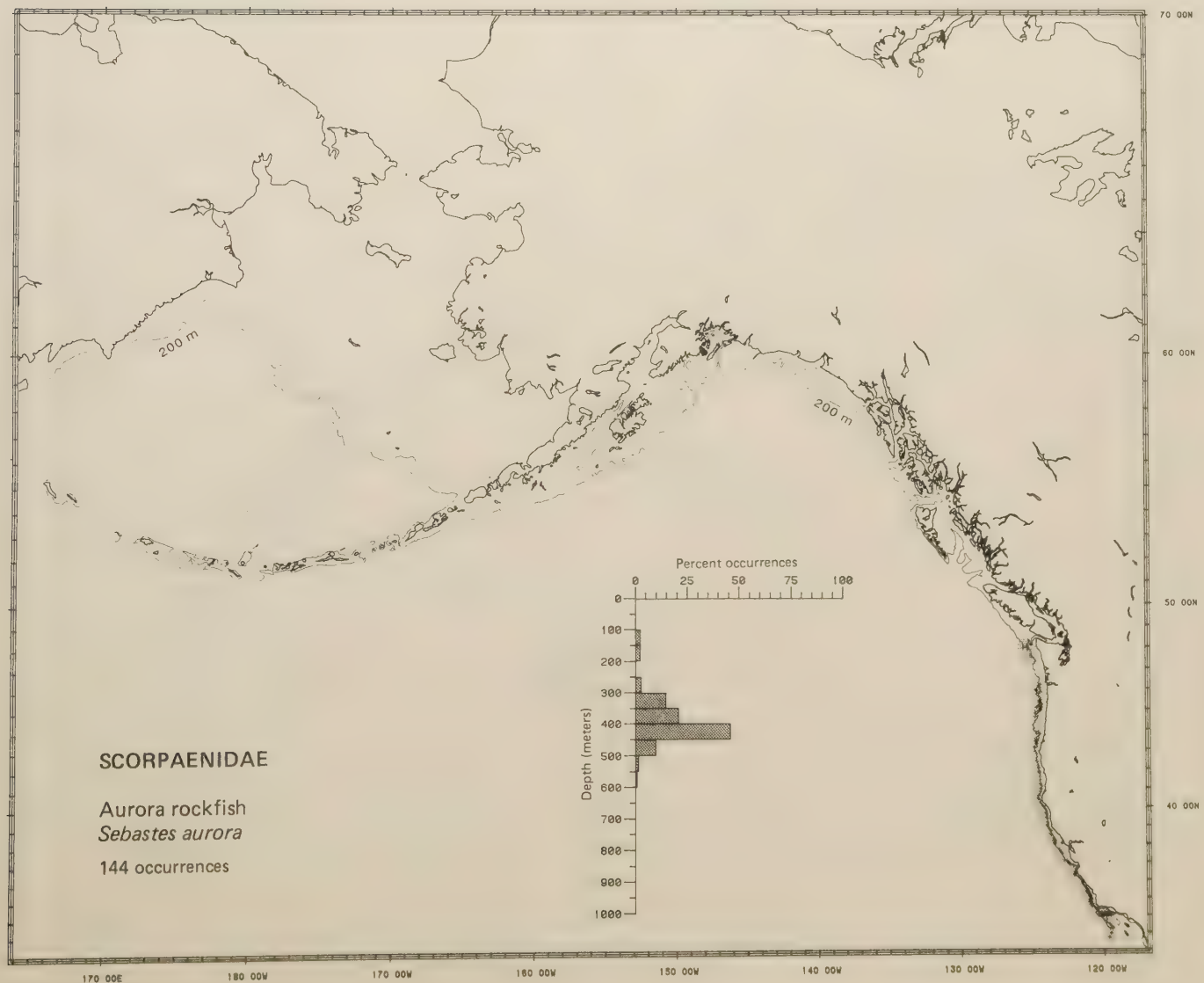


Literature Reported from Amphitrite Point on Vancouver Island, British Columbia, to Cedros Island, Baja California (Miller and Lea 1972), at depths of 183 to 768 m (Eschmeyer and Herald 1983).

Survey data Found from Cape Flattery, Washington, to the Patton Escarpment off southern California. Depth range 125 to 575 m, most frequently (45.8% of occurrences) on the mesobenthal slope from 400 to 450 m, and 95.8% of occurrences from depths of 150 to 500 m. Survey data provide a new shallow depth limit.

Conclusions

Zoogeography	Oregonian-San Diegan
Life zone	Outer shelf-mesobenthal (mesobenthal)
Range	From Amphitrite Point, Vancouver Island, to Cedros Island, Baja California
Depth	125 to 768 m

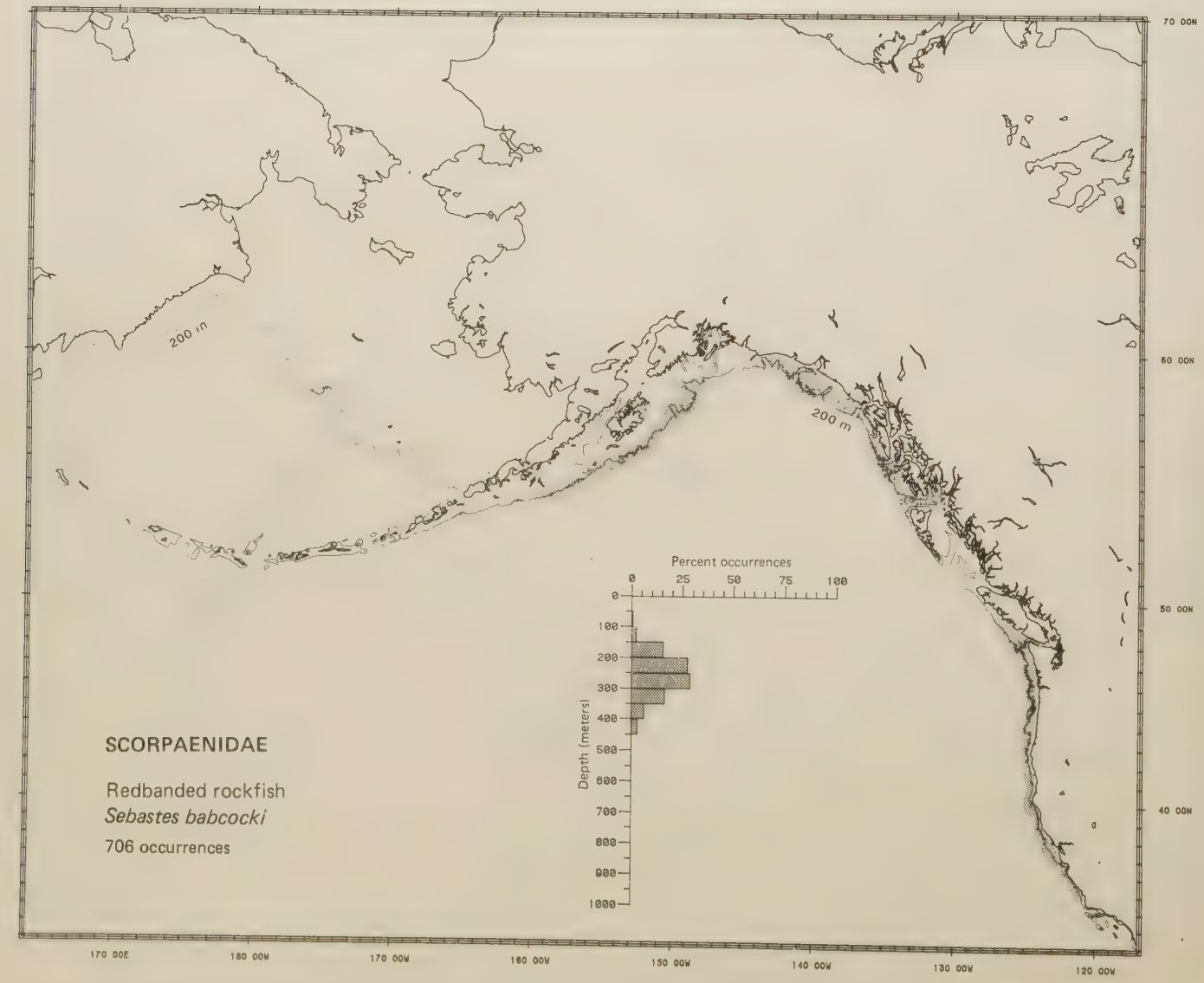


Literature Reported from the Bering Sea and Amchitka Island in the Aleutian Islands to San Diego, California (Howe 1981; Eschmeyer and Herald 1983), at depths of 49 to 550 m (Fedorov 1973a).

Survey data Found from northwest of Zhemchug Canyon on the central slope of the eastern Bering Sea and Tigalda Island in the Aleutian Islands to Morro Bay, California. Depth range 75 to 625 m, most frequently (28.5% of occurrences) on the mesobenthal slope from 250 to 300 m, and 96.6% of occurrences from depths of 150 to 450 m. Survey data provide a more precise description of the northern limit of this species in the Bering Sea and a new maximum depth record.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Outer shelf-mesobenthal (mesobenthal)
Range	From Zhemchug Canyon in the Bering Sea and Amchitka Island in the Aleutian Islands to San Diego, California
Depth	49 to 625 m



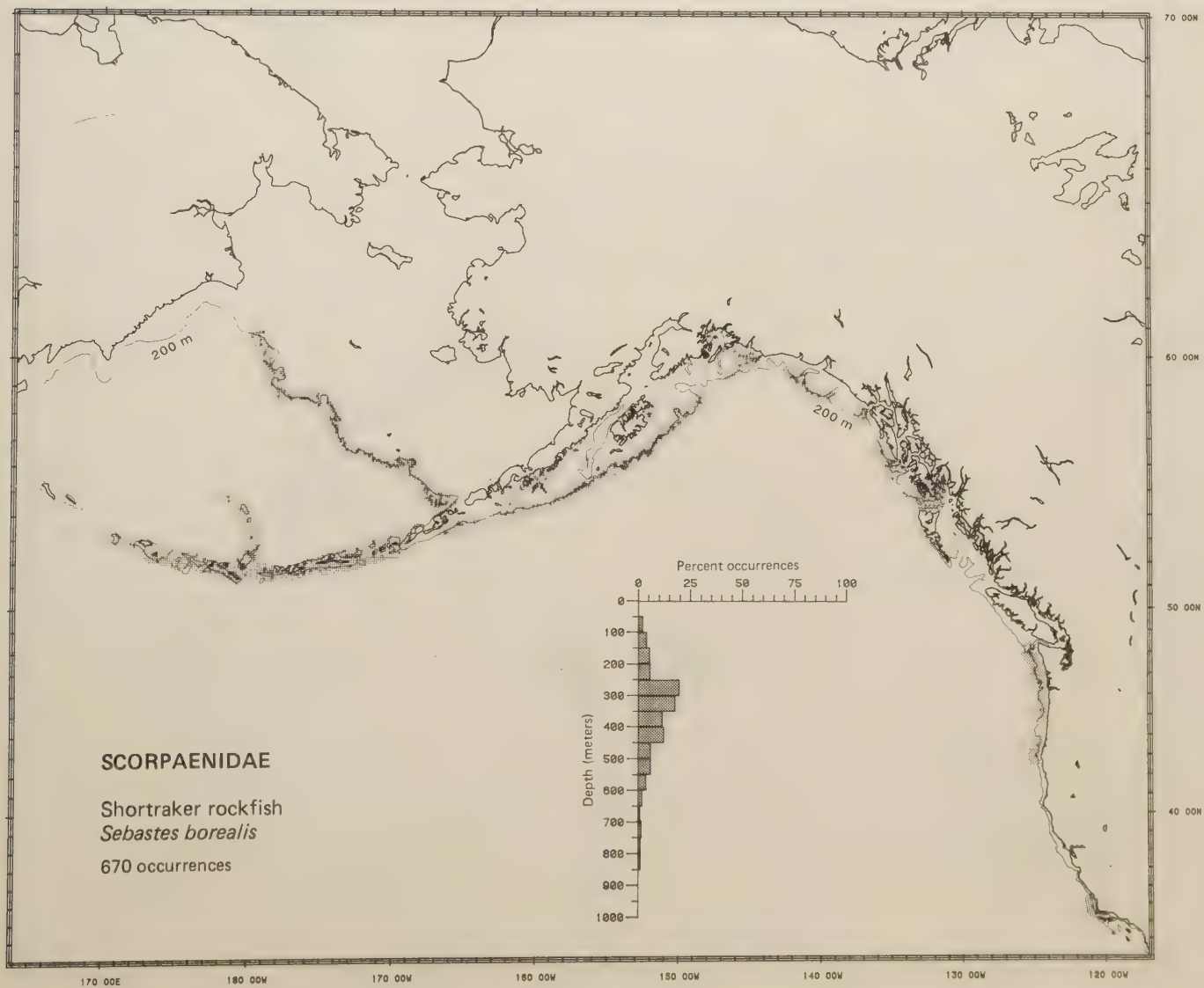
SHORTRAKER ROCKFISH, *Sebastes borealis* Barsukov 1970

Literature Reported from southeastern Kamchatka to the northwest Bering Sea and Aleutian Islands south to Fort Bragg, California (Quast and Hall 1972; Eschmeyer and Herald 1983), at depths of 0 to 800 m (Fedorov 1973a; Howe 1981).

Survey data Found from Navarin Canyon on the northwest slope of the eastern Bering Sea and Stalemate Bank and Bowers Bank in the Aleutian Islands south to Point Conception, California. Depth range 25 to 875 m, most frequently (19.6% of occurrences) on the mesobenthal slope from 250 to 300 m, and 95.2% of occurrences from depths of 50 to 650 m. Survey data provide a more precise description of the northern and Aleutian limits, a new southern limit, and a new maximum depth record.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-bathybenthal (mesobenthal)
Range	From southeastern Kamchatka to Navarin Canyon in the Bering Sea and in the Aleutian Islands to Stalemate Bank, and south to Point Conception, California
Depth	0 to 875 m

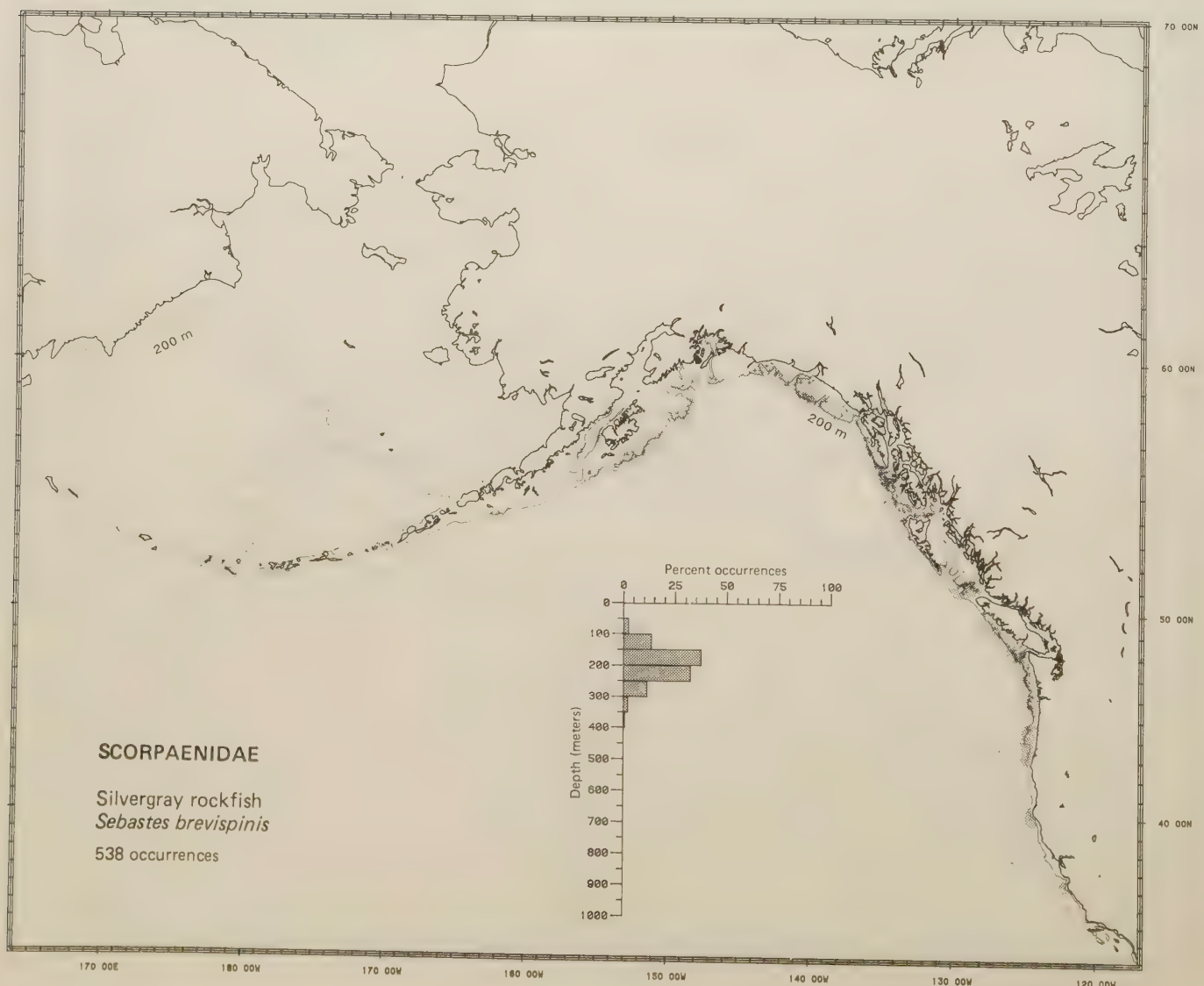


Literature Reported from the Bering Sea to Baja California (Howe 1981; Eschmeyer and Herald 1983), at depths of 0 to 366 m (Hart 1973; Eschmeyer and Herald 1983).

Survey data Found from Sanak Island in the Gulf of Alaska to Point Sur, California. Depth range 25 to 375 m, most frequently (37.4% of occurrences) on the outer shelf between 150 and 200 m, and 94.4% of occurrences from depths of 100 to 300 m. Survey data slightly extend the known maximum depth.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Outer shelf-mesobenthal (outer shelf)
Range	From the Bering Sea to Baja California
Depth	0 to 375 m



DUSKY ROCKFISH, *Sebastes ciliatus* (Tilesius 1810)

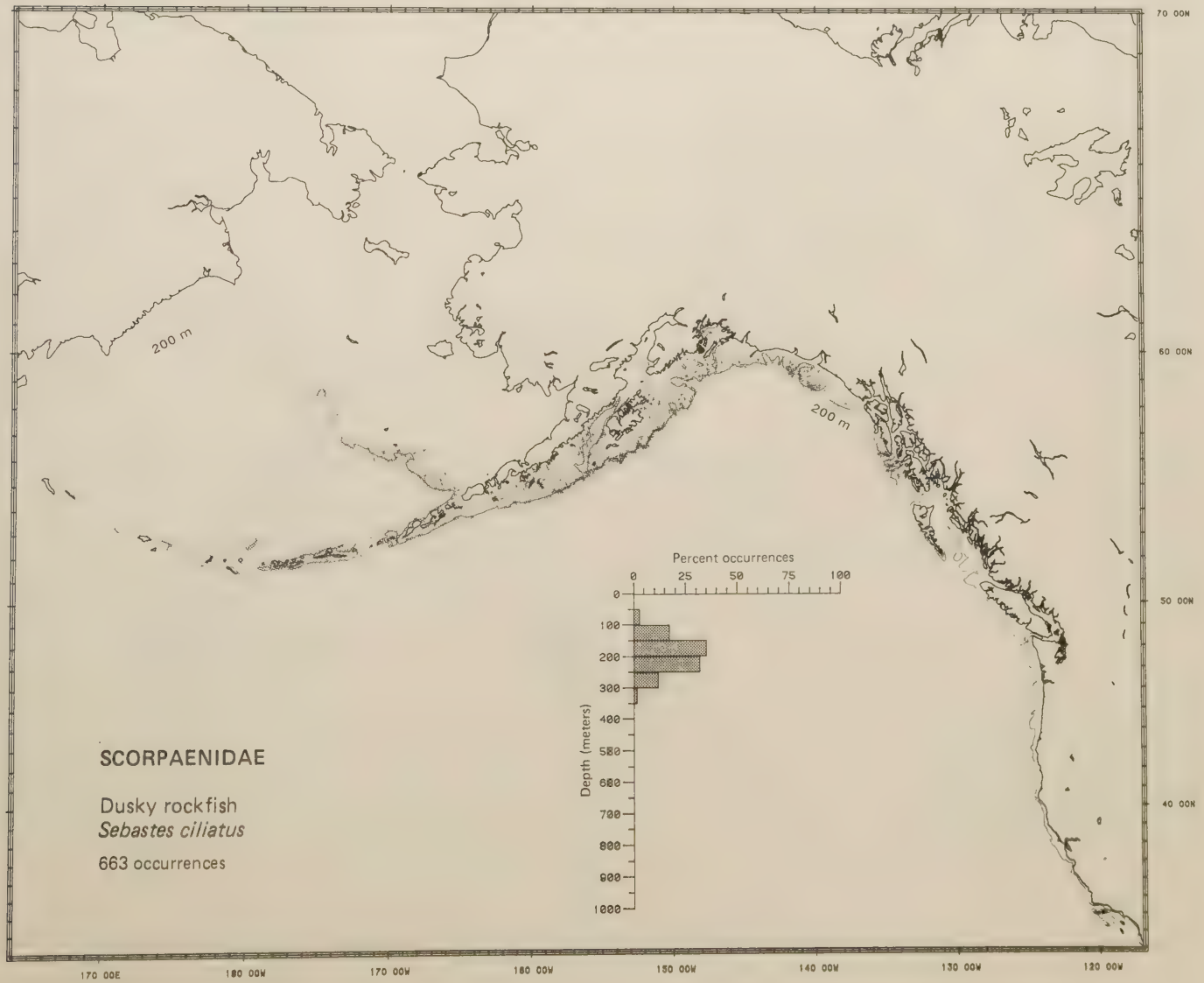
Taxonomic comment The dusky rockfish collected in these surveys may include a new species that is being described by J. Blackburn, Alaska Dep. Fish Game (Kessler 1985).

Literature Reported from the Bering Sea and from Amchitka Island in the Aleutian Islands to Johnstone Strait, British Columbia (Simenstad et al. 1977; Richards and Westrheim in press), at depths of 2 to 366 m (Howe 1981).

Survey data Found from Zhemchug Canyon on the central slope of the eastern Bering Sea and Agattu Island in the Aleutian Islands east to Kruzof Island in southeast Alaska. Depth range 75 to 525 m, most frequently (35.0% of occurrences) on the outer shelf from 150 to 200 m, and 95.6% of occurrences from depths of 100 to 300 m. Survey data provide a more precise description of the distribution in the Bering Sea and the Aleutian Islands, and a new maximum depth record.

Conclusions

Zoogeography	Aleutian
Life zone	Outer shelf-mesobenthal (outer shelf)
Range	From Zhemchug Canyon in the Bering Sea and Agattu Island in the Aleutian Islands to Johnstone Strait, British Columbia
Depth	2 to 525 m



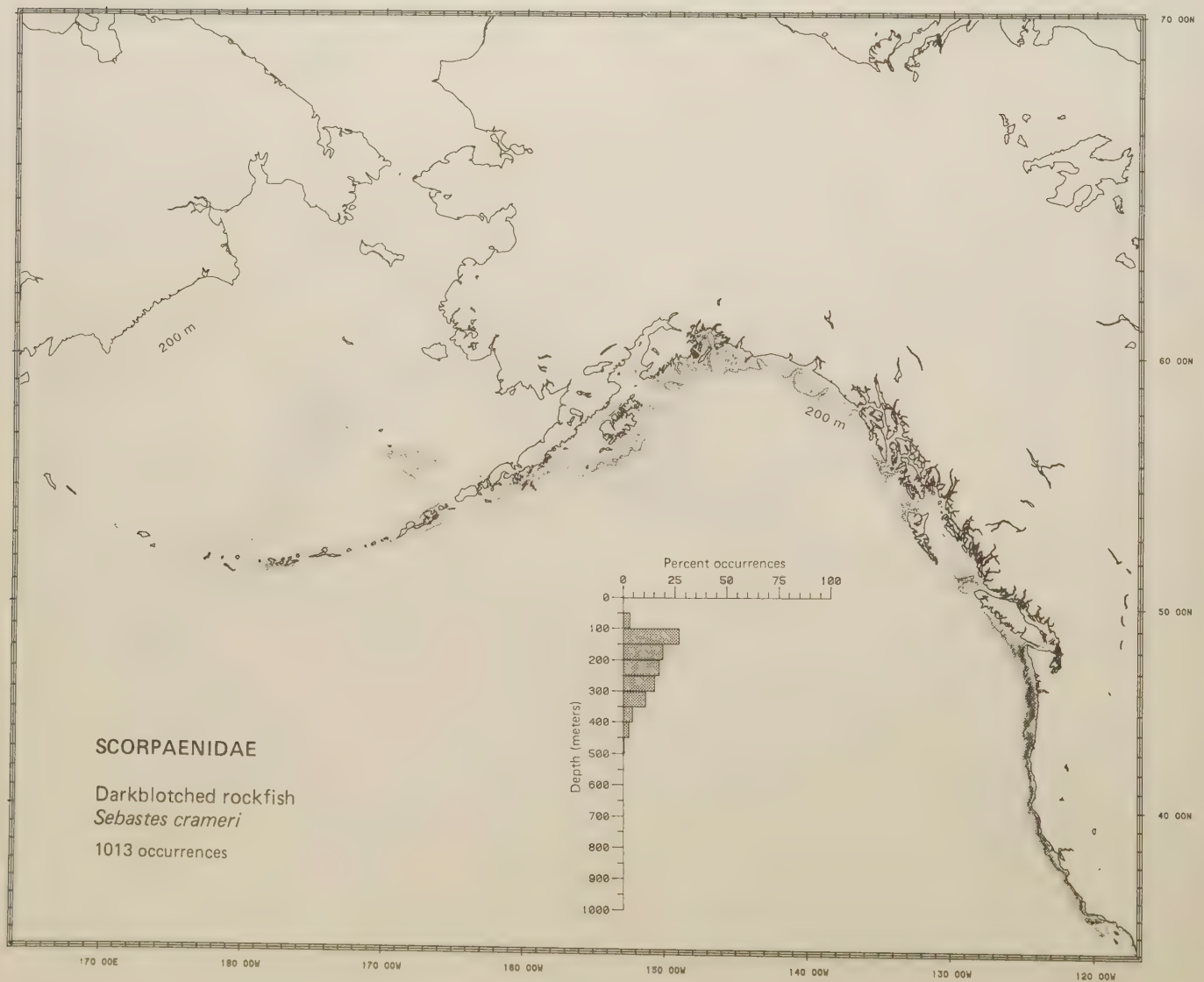
DARKBLOTCHED ROCKFISH, *Sebastes crameri* (Jordan 1897 *in* Gilbert) — Scorpaenidae: Scorpionfishes

Literature Reported from the Bering Sea to Santa Catalina Island, California, at depths of 29 to 600 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from southeast of Zhemchug Canyon in the eastern Bering Sea and Tanaga Island in the Aleutian Islands south to Point Arguello, California. Depth range 25 to 475 m, most frequently (26.9% of occurrences) on the outer shelf between 100 and 150 m, and 96.5% of occurrences from depths of 50 to 400 m. Survey data provide a more precise description of the distribution in the Bering Sea and extend the known range in the Aleutian Islands.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From southeast of Zhemchug Canyon in the Bering Sea to Santa Catalina Island, California
Depth	25 to 600 m



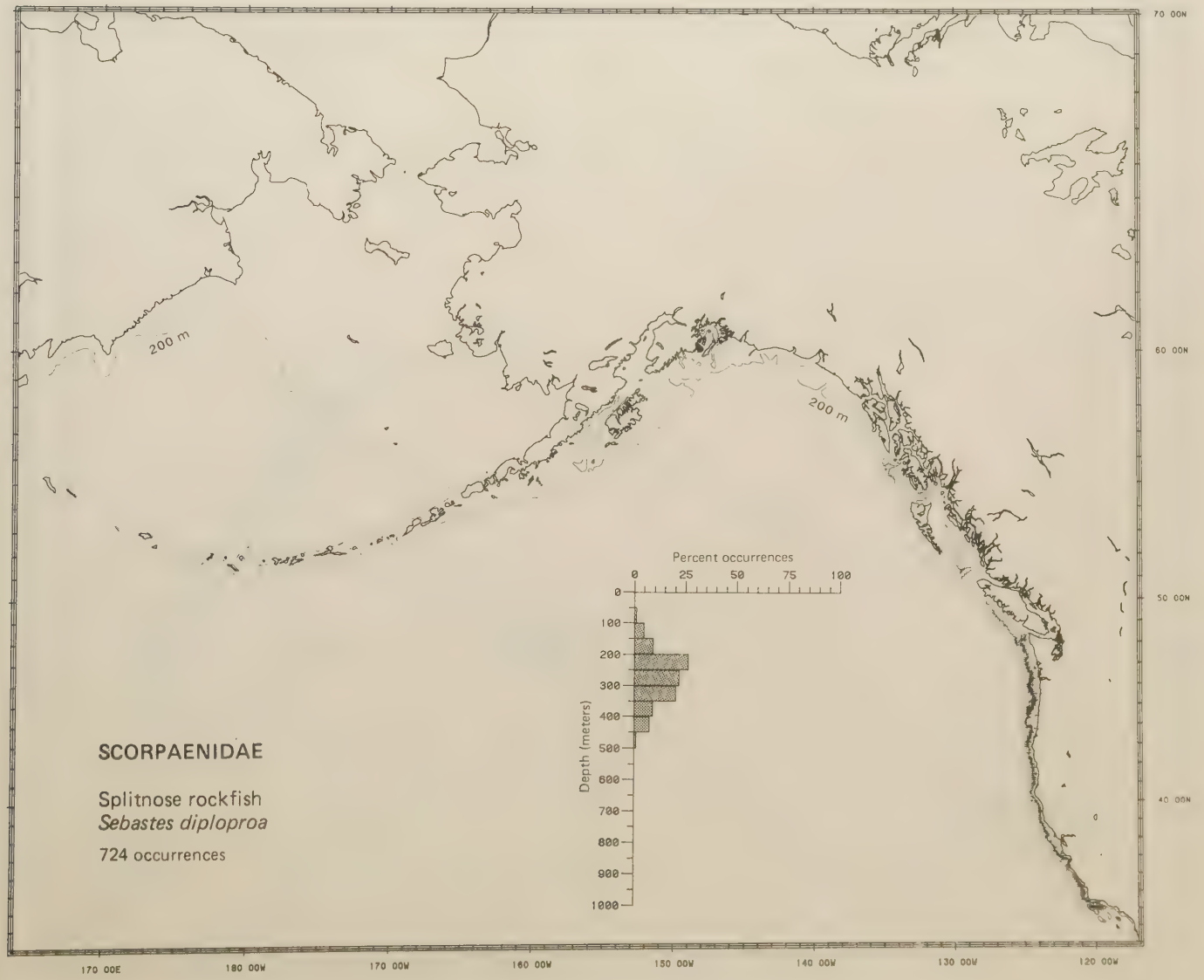
SPLITNOSE ROCKFISH, *Sebastes diploproa* (Gilbert 1890)

Literature Reported from the Alaska Peninsula to Cedros Island off Baja California and in the Gulf of California (Miller and Lea 1972; Hart 1973; Howe 1981), at depths of 0 to 800 m (Mitchell and Hunter 1970; Howe 1981).

Survey data Found from Prince William Sound in the Gulf of Alaska to the Santa Barbara Channel, California. Depth range 75 to 475 m, most frequently (26.1% of occurrences) on the mesobenthal slope between 200 and 250 m, and 97.8% of occurrences from depths of 100 to 450 m. Although survey data provide no new information on geographic or depth range, they do provide a more detailed center of depth distribution.

Conclusions

Zoogeography	Eastern temperate Pacific
Life zone	Outer shelf-mesobenthal (mesobenthal)
Range	From the Alaska Peninsula to Cedros Island, Baja California, and the Gulf of California
Depth	0 to 800 m

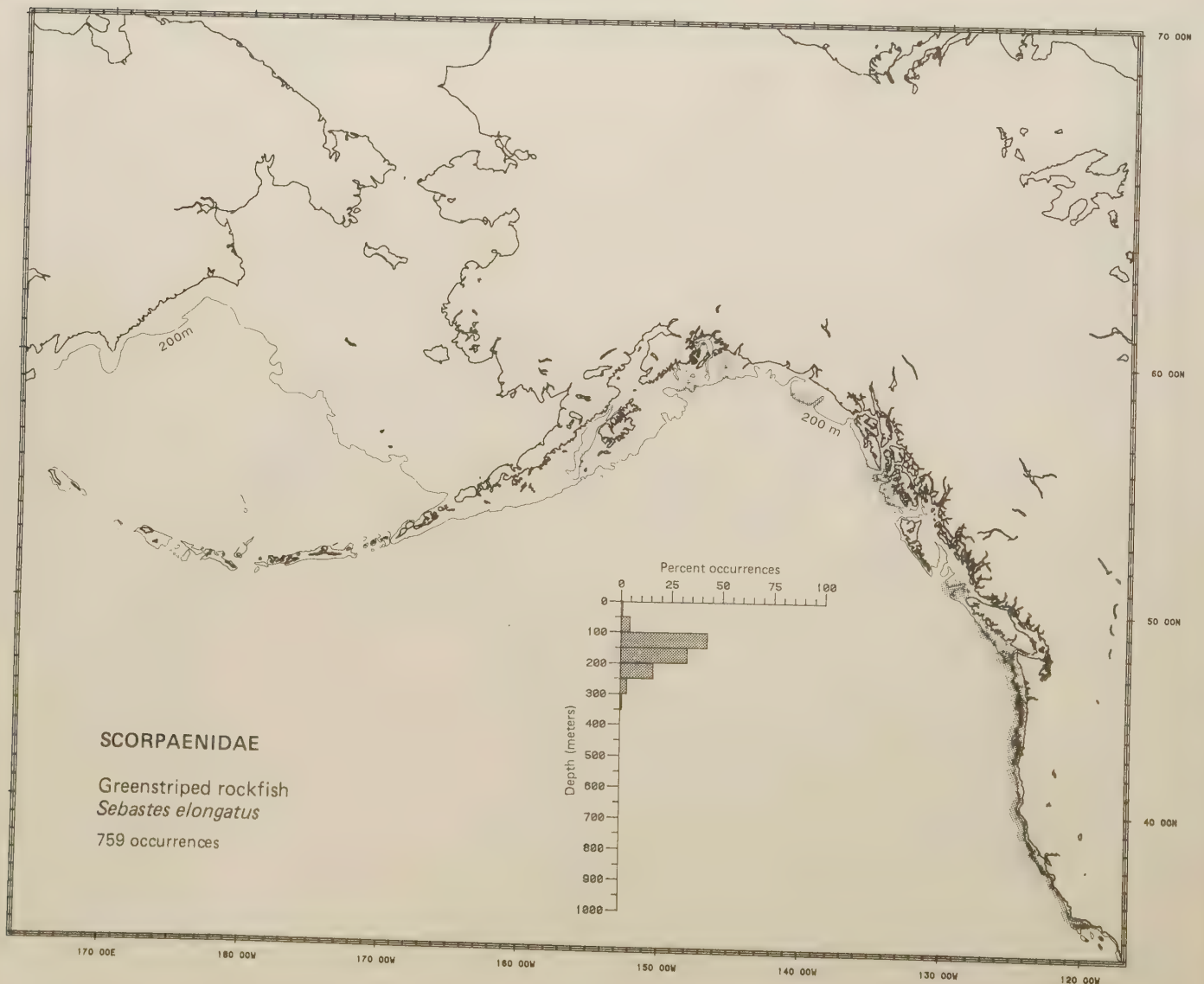


Literature Reported from Green Island near Montague Island in the northern Gulf of Alaska to Cedros Island, Baja California (Hart 1973; Eschmeyer and Herald 1983), at depths of 61 to 402 m (Eschmeyer and Herald 1983).

Survey data Found from offshore of Chirikof Island (southwest of Kodiak Island) in the Gulf of Alaska to Santa Cruz Island, California. Depth range 25 to 425 m, most frequently (42.3% of occurrences) on the outer shelf from 100 to 150 m, and 95.0% of occurrences from depths between 50 and 250 m. Survey data extend both the known depth range and known geographic range in the northwest.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Chirikof Island in the Gulf of Alaska to Cedros Island, Baja California
Depth	25 to 425 m



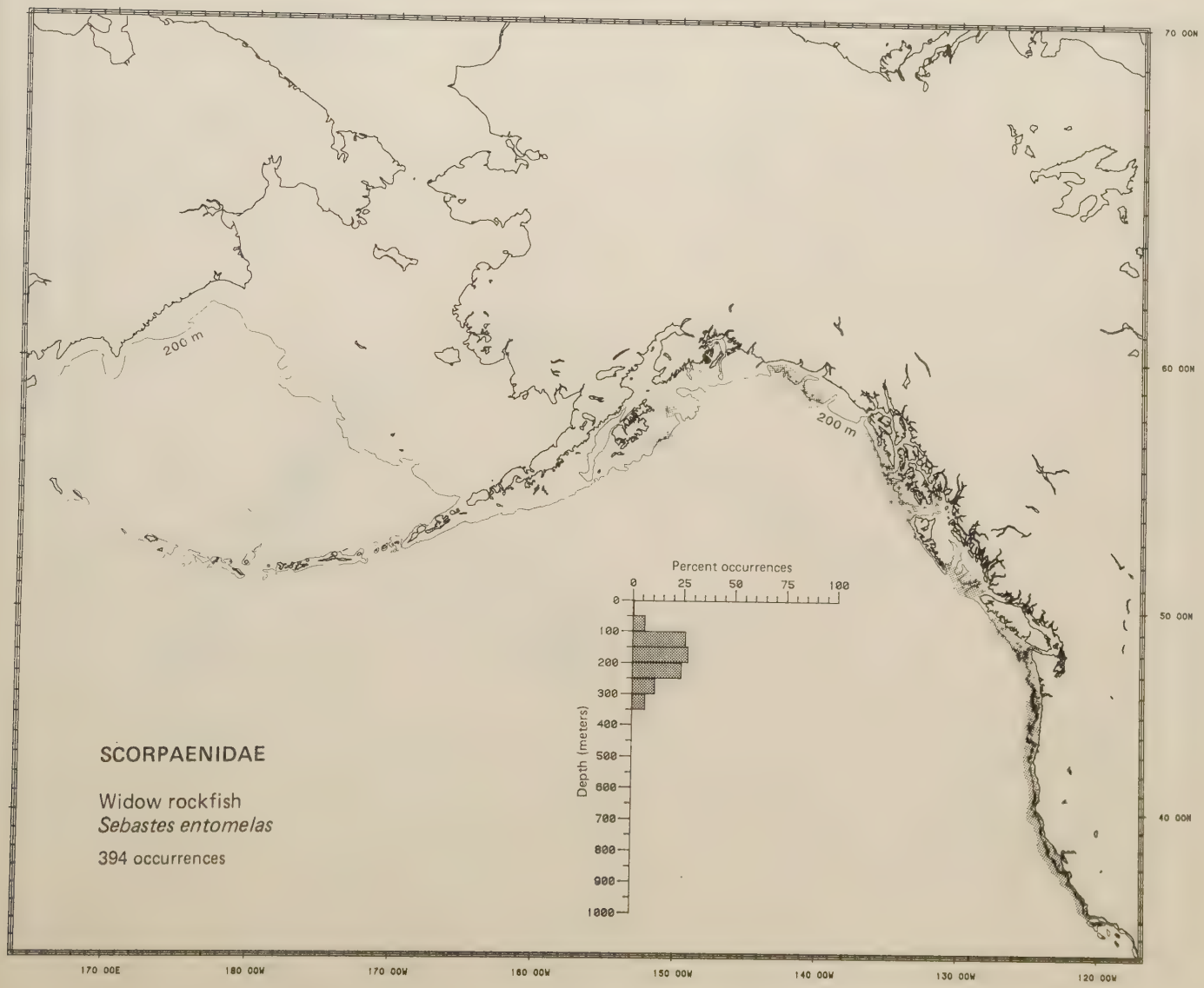
WIDOW ROCKFISH, *Sebastes entomelas* (Jordan and Gilbert 1880)

Literature Reported from southeastern Alaska to Todos Santos Bay, Baja California (Hart 1973; Eschmeyer and Herald 1983), at depths of 0 to 366 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Middle Albatross Bank (east of Kodiak Island) to Point Arguello, California. Depth range 25 to 375 m, most frequently (26.9% of occurrences) on the outer shelf between 150 and 200 m, and 99.2% of occurrences from depths of 50 to 350 m. Survey data extend the northern limit and provide a slightly greater maximum known depth.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Middle Albatross Bank in the Gulf of Alaska to Todos Santos Bay, Baja California
Depth	0 to 375 m



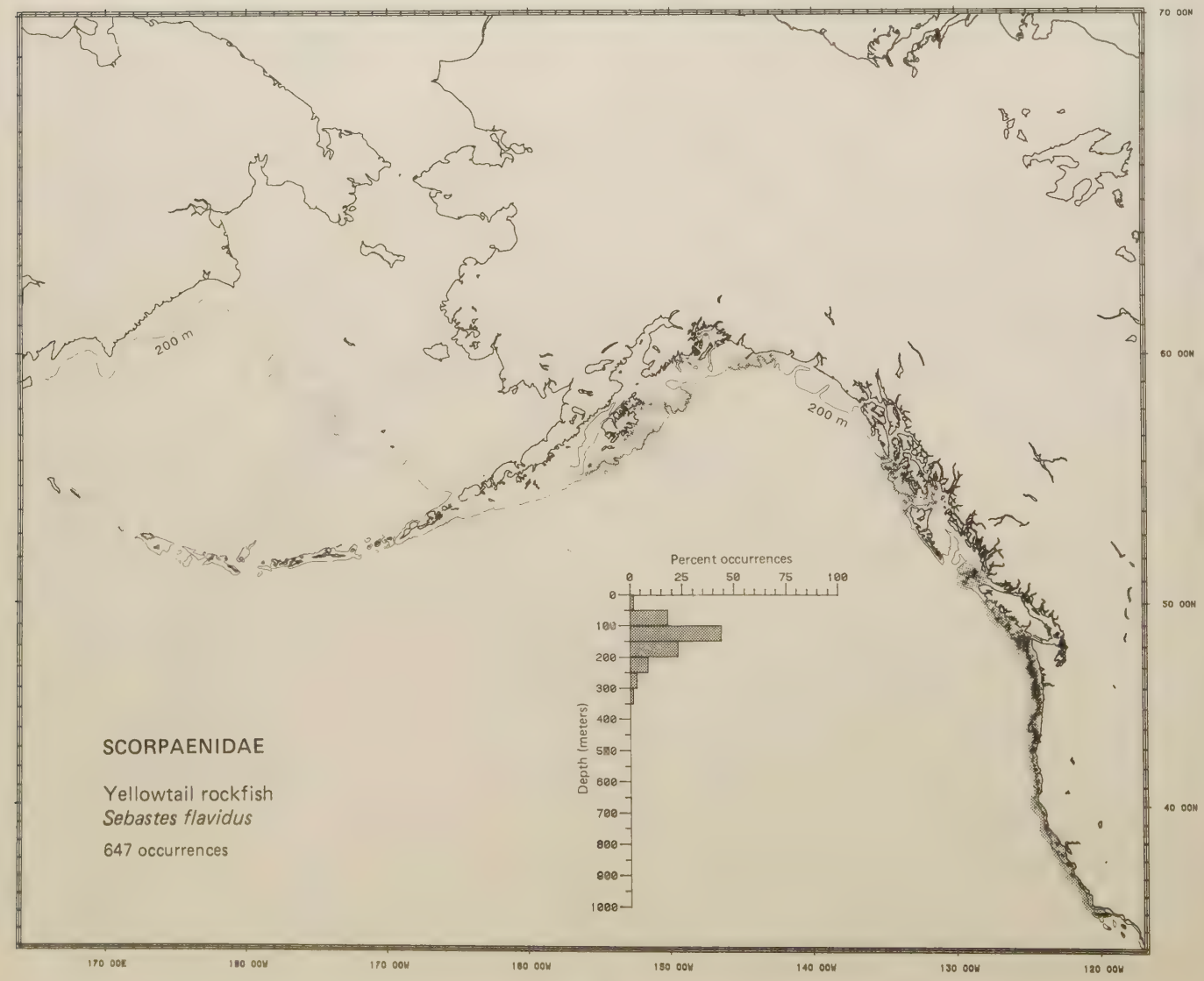
YELLOWTAIL ROCKFISH, *Sebastes flavidus* (Ayres 1863)

Literature Reported geographically from Kodiak Island, Alaska, to San Diego, California, and at depths of 0 to 549 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Unalaska Island in the Aleutian Islands to Point Conception, California. Depth range 25 to 475 m, most frequently (43.7% of occurrences) on the outer shelf between 100 and 150 m, and 96.4% of occurrences from depths of 50 to 300 m. Survey data extend the northwestern known limit.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Unalaska Island, Alaska, to San Diego, California
Depth	0 to 549 m



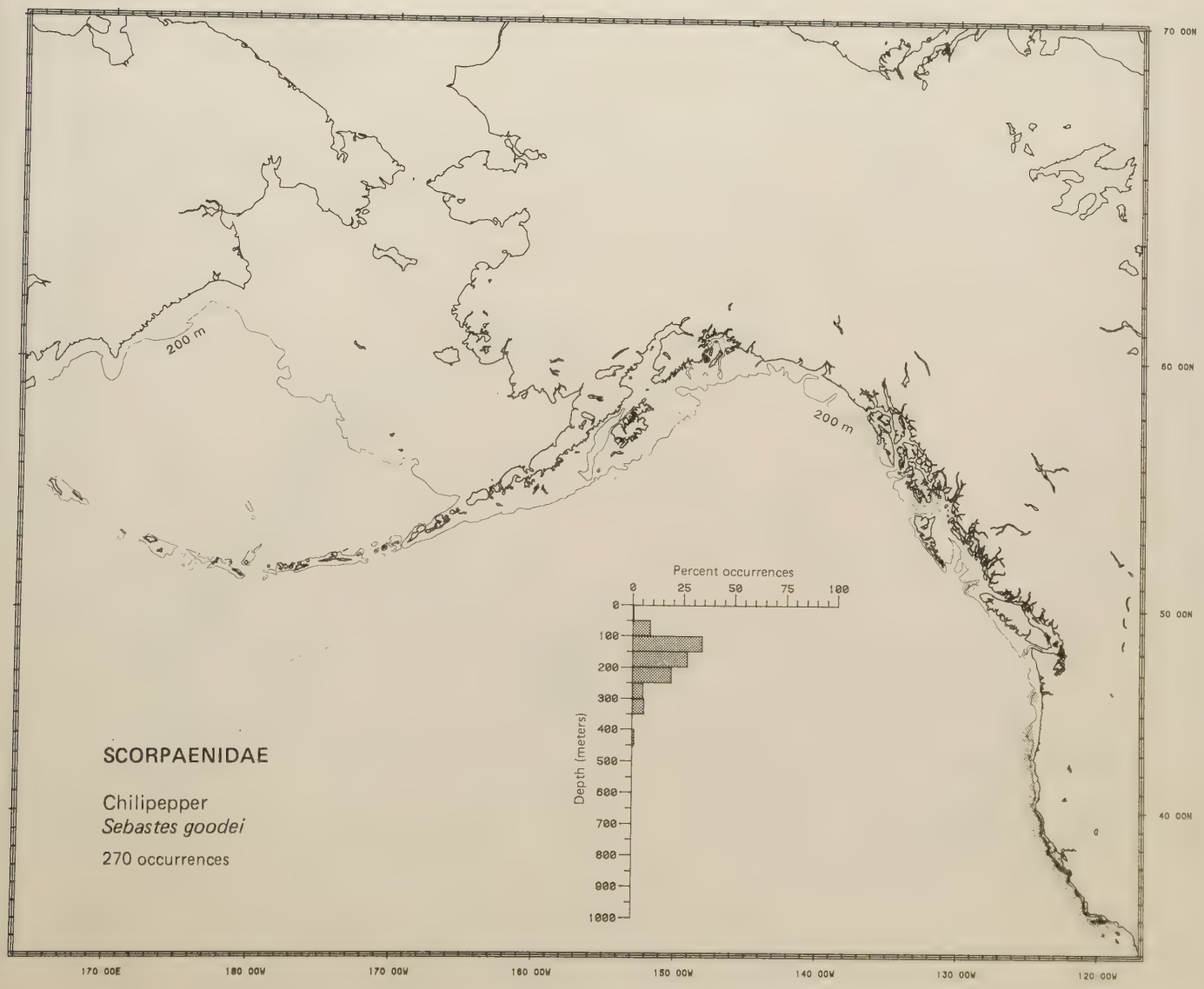
CHILIPEPPER, *Sebastes goodei* (Eigenmann and Eigenmann 1890)

Literature Reported from northwestern Vancouver Island, British Columbia, to Magdalena Bay, Baja California Sur (Hart 1973), at depths of 0 to 329 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Queen Charlotte Sound, British Columbia, to Oxnard, California. Depth range 25 to 425 m, most frequently (33.7% of occurrences) on the outer shelf from 100 to 150 m, and 98.5% of occurrences from depths of 50 to 350 m. Survey data provide new maximum depth and northern limits.

Conclusions

Zoogeography	Oregonian-San Diegan
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Queen Charlotte Sound, British Columbia, to Magdalena Bay, Baja California Sur
Depth	0 to 425 m

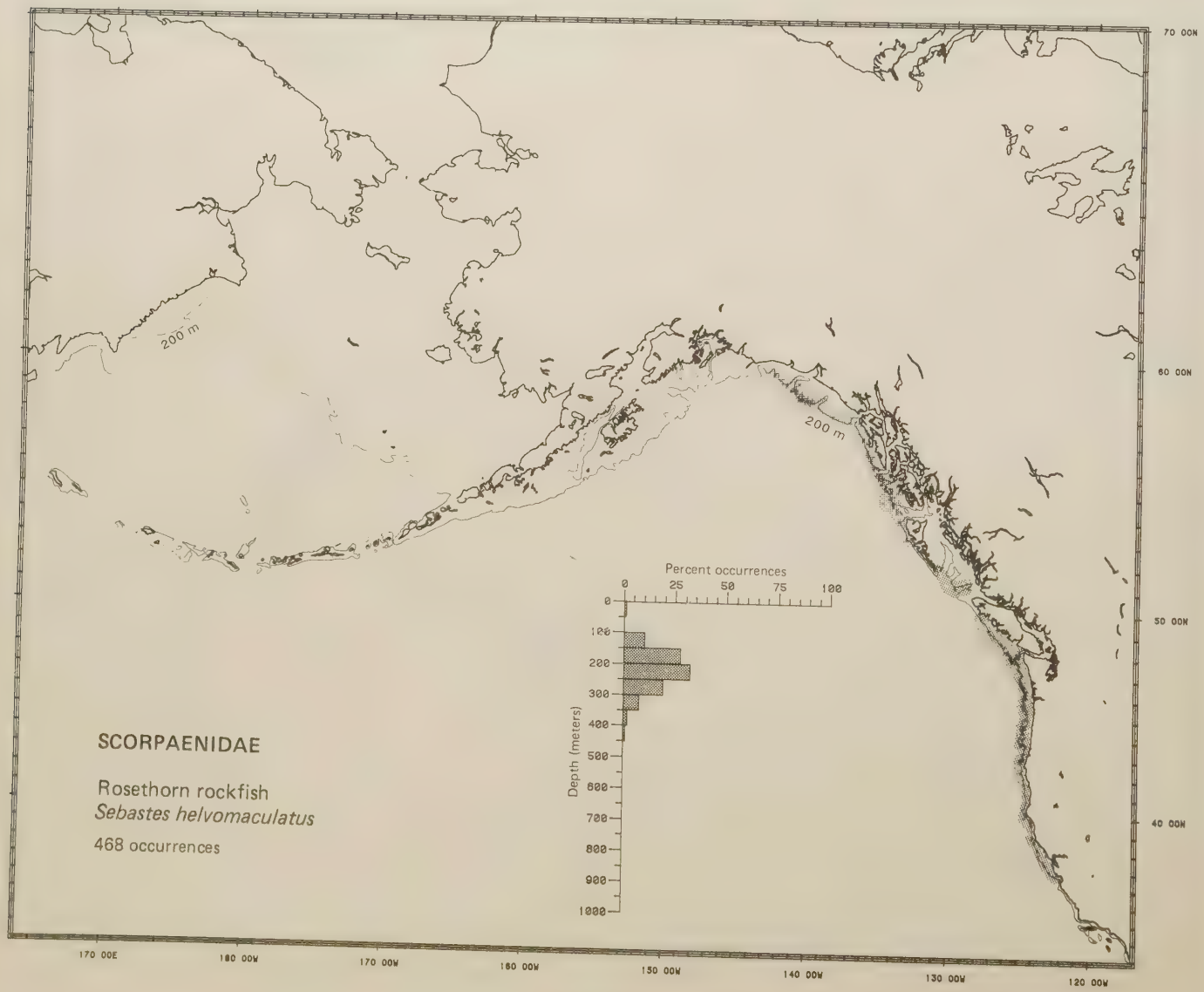


Literature Reported from Kodiak Island, Alaska, to Guadalupe Island off Baja California, at depths of 75 to 549 m (Hart 1973; Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from offshore of Icy Bay in the Gulf of Alaska to Monterey Bay, California. Depth range 25 to 425 m, most frequently (32.1% of occurrences) on the upper slope between 200 and 250 m, and 96.1% of occurrences from depths of 100 to 350 m. Survey data provide a new minimum known depth.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Outer shelf-mesobenthal (mesobenthal)
Range	From Kodiak Island, Alaska, to Guadalupe Island, Baja California
Depth	25 to 549 m



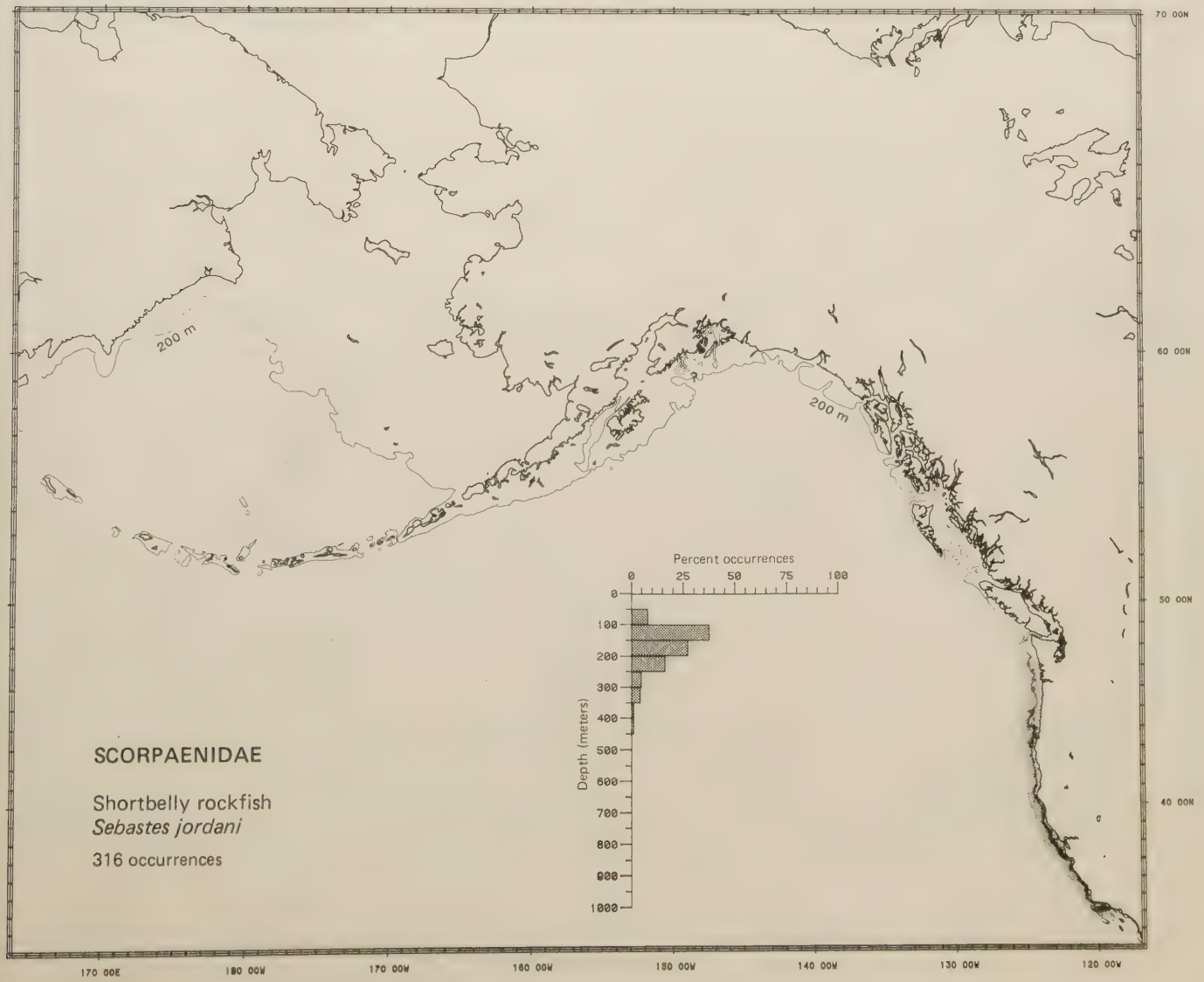
SHORTBELLY ROCKFISH, *Sebastes jordani* (Gilbert 1896)

Literature Reported from La Perouse Bank, Vancouver Island, to Benito Island, Baja California (Hart 1973; Moser et al. 1977), at depths of 0 to 283 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Granite Island, Kenai Peninsula, Alaska, to the Santa Barbara Channel, California. Depth range 25 to 475 m, most frequently (37.3% of occurrences) on the outer shelf from 100 to 150 m, and 97.5% of occurrences from depths of 50 to 350 m. Survey data extend the northernmost known limit and maximum known depth. However, the northern record is extremely far removed from the next most northerly records (La Perouse Bank, Vancouver Island, in the literature and Grays Harbor, Washington, in the survey data) and hence must be regarded as questionable.

Conclusions

Zoogeography	Oregonian-San Diegan
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From La Perouse Bank, Vancouver Island (possibly from Granite Island off the Kenai Peninsula, Alaska), to Benito Island, Baja California
Depth	0 to 350 m



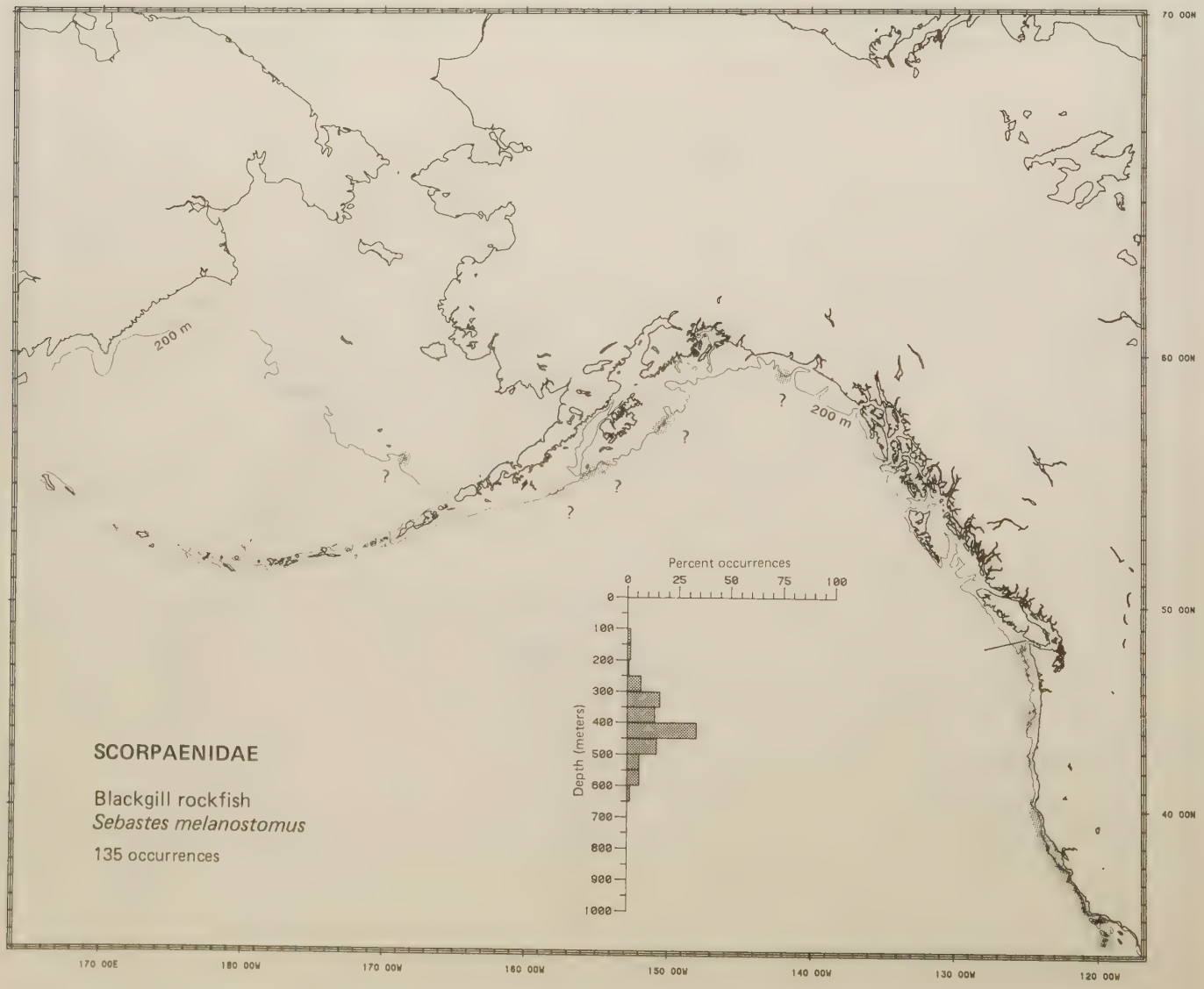
BLACKGILL ROCKFISH, *Sebastes melanostomus* (Eigenmann and Eigenmann 1890)

Literature Reported from Washington to Cedros Island, Baja California (Hart 1973; Eschmeyer and Herald 1983). Previously reported from the Bering Sea and Aleutian Islands, but these were presumably records of the closely related shortraker rockfish, *Sebastes borealis*, which was not described until 1970 (Barsukov 1970; Tsuyuki and Westrheim 1970; Hart 1973). Reported at depths of 218 to 768 m (Miller and Lea 1972; Hart 1973).

Survey data Found from Pribilof Canyon in the southeastern Bering Sea to the Patton Escarpment off southern California. Depth range 125 to 625 m, most frequently (33.3% of samples) on the mesobenthal slope between 400 and 450 m, and 94.8% of occurrences from depths of 250 to 600 m. Survey data include records of this species in the Bering Sea and Gulf of Alaska. Because the survey data extend as far back as 1953, before the discovery of the shortraker rockfish, these records may actually not be of the blackgill rockfish. Thus until recent verifiable records of the blackgill rockfish are obtained from these northern areas, Washington will be considered the northern limit for the species. The survey data extend the shallow edge of the known range of this species to 125 m.

Conclusions

Zoogeography	Oregonian-San Diegan
Life zone	Mesobenthal-bathybenthal (mesobenthal)
Range	From Washington to Cedros Island, Baja California
Depth	125 to 768 m



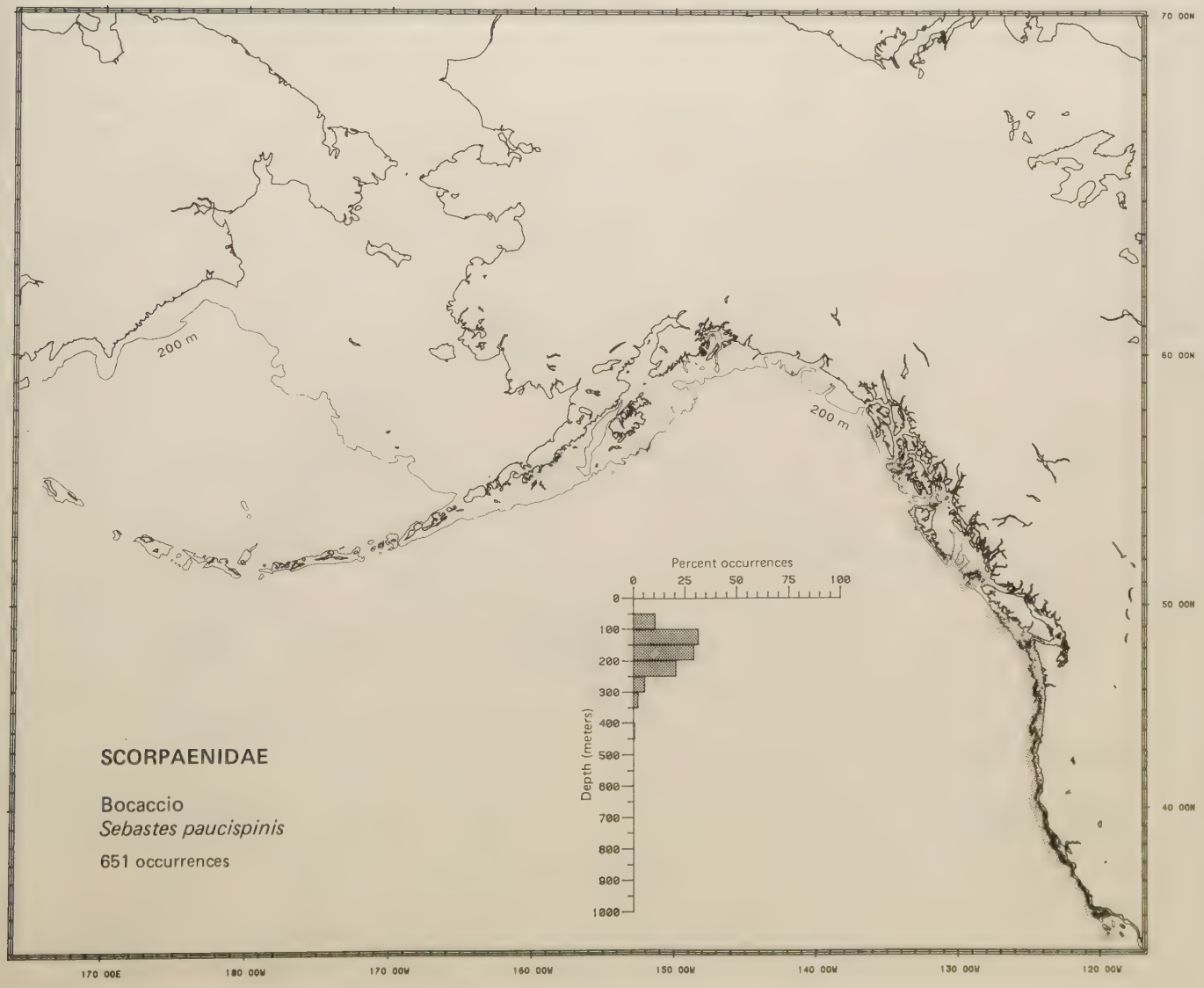
BOCACCIO, *Sebastes paucispinis* Ayres 1854

Literature Reported from Kodiak Island, Alaska, to Punta Blanca, Baja California (Miller and Lea 1972), at depths of 0 to 320 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Stepovak Bay on the Alaska Peninsula to south of San Nicolas Island, California. Depth range 25 to 475 m, most frequently (31.2% of occurrences) on the outer shelf from 100 to 150 m, and 96.7% of occurrences from depths of 50 to 300 m. Survey data extend the known range to the northwest and to a greater depth.

Conclusions

Zoogeography	Eastern boreal Pacific-San Diegan
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Stepovak Bay on the Alaska Peninsula to Punta Blanca, Baja California
Depth	0 to 475 m



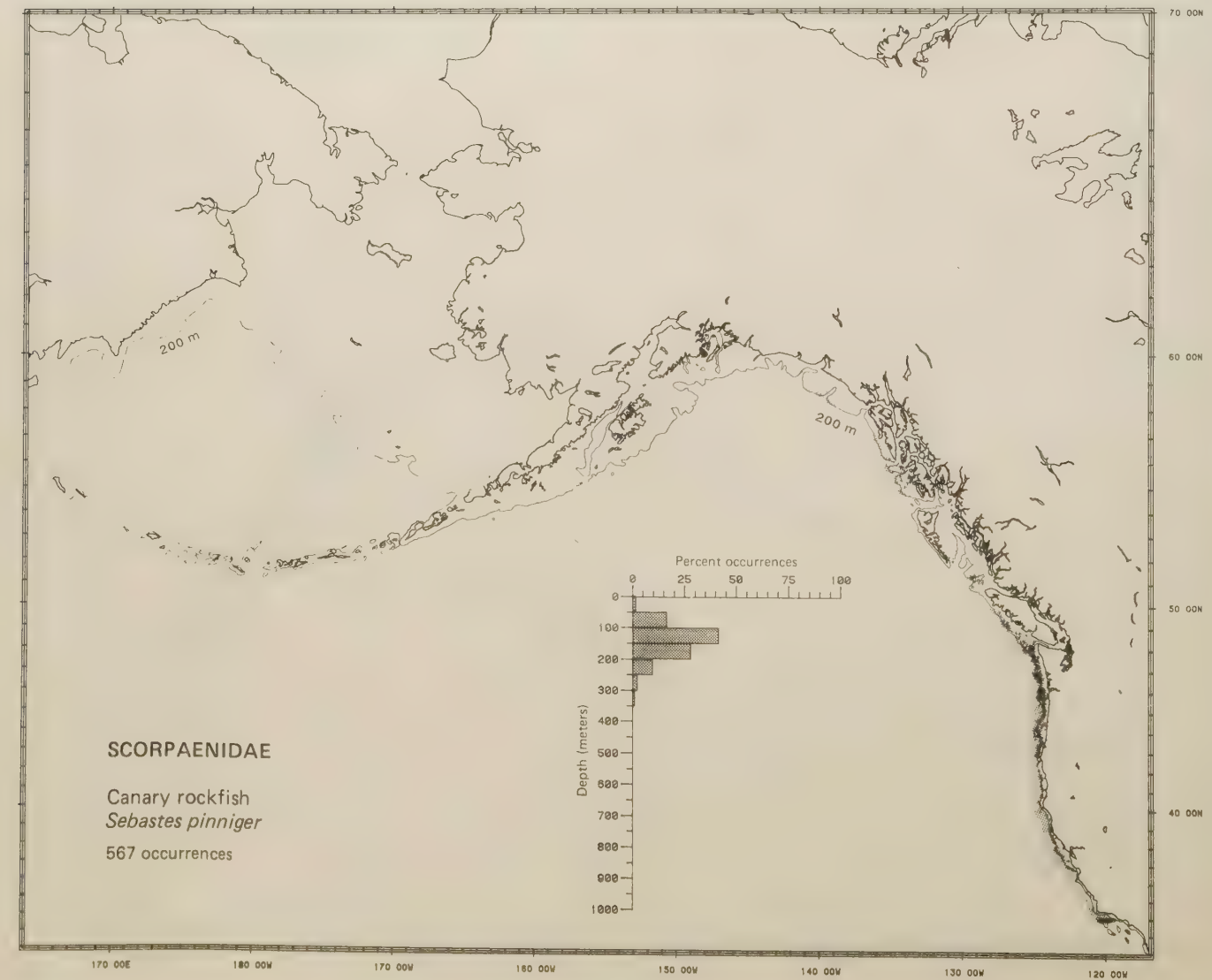
CANARY ROCKFISH, *Sebastes pinniger* (Gill 1864)

Literature Reported from Cape Bartolome, Alaska, to Cape Colnett, Baja California (Miller and Lea 1972), at depths of 0 to 366 m (Hart 1973; Howe 1981).

Survey data Found from the slope south of Shelikof Strait in the Gulf of Alaska to Santa Barbara, California. Depth range 25 to 425 m, most frequently (41.4% of occurrences) on the outer shelf between 100 and 150 m, and 95.2% of occurrences from depths of 50 to 250 m. Survey data extend the known range into the western Gulf of Alaska and provide a greater maximum depth.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From south of Shelikof Strait in the Gulf of Alaska to Cape Colnett, Baja California
Depth	0 to 425 m



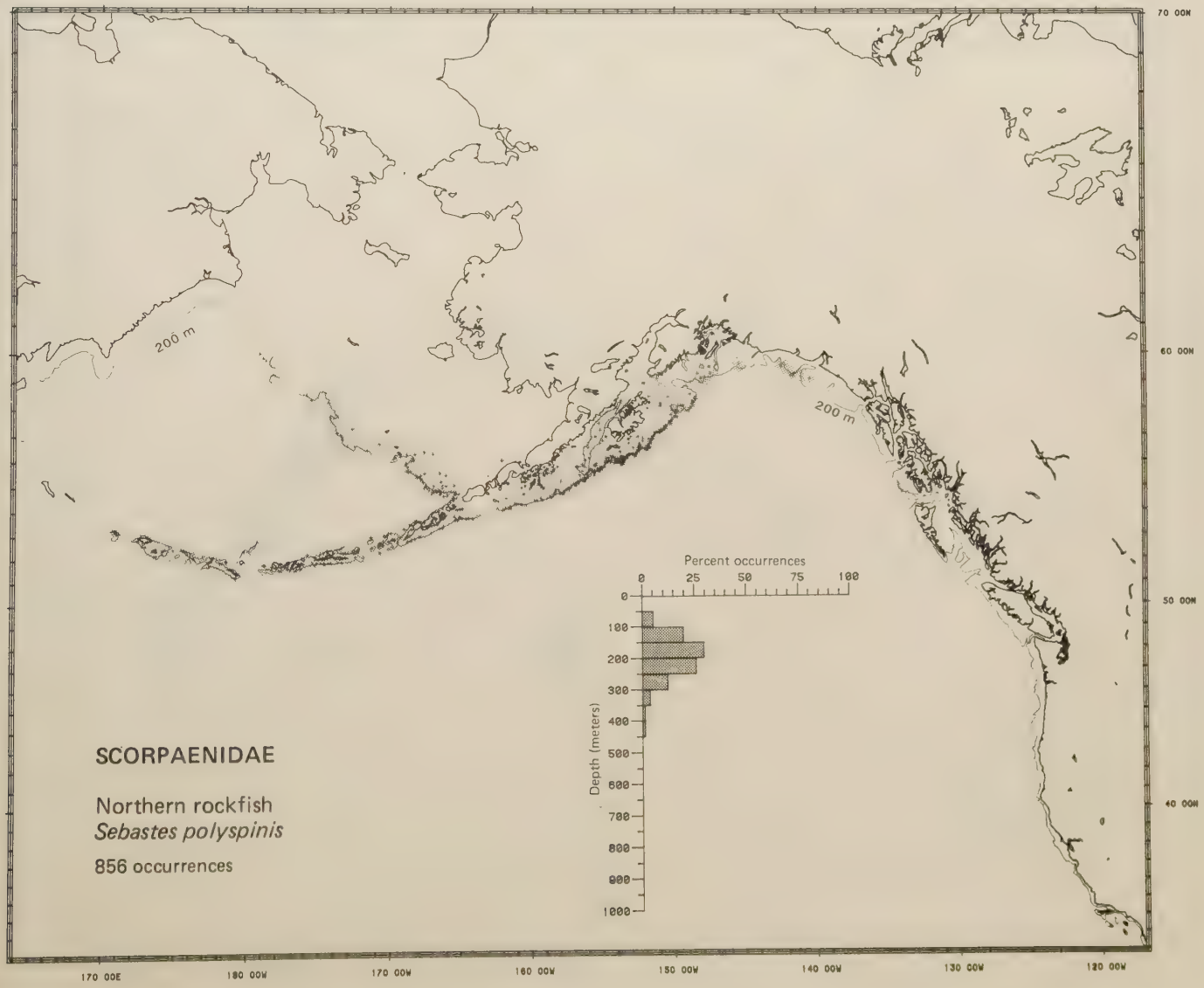
NORTHERN ROCKFISH, *Sebastes polyspinis* (Taranets and Moiseev 1933) Scorpaenidae: Scorpionfishes

Literature Reported from eastern Kamchatka to the Bering Sea, west in the Aleutian Islands to Amchitka Island, and east to Yakutat, Alaska (Quast and Hall 1972; Simenstad et al. 1977; Eschmeyer and Herald 1983), at depths of 73 to 358 m (Eschmeyer and Herald 1983).

Survey data Found from Pervenets Canyon on the northwest slope of the eastern Bering Sea and Stalemate Bank in the Aleutian Islands east to northern Graham Island, British Columbia. Depth range 75 to 625 m, most frequently (29.6% of occurrences) on the outer shelf from 150 to 200 m, and 96.7% of occurrences from depths of 50 to 350 m. Survey data provide a more precise distribution in the Bering Sea and Aleutian Islands, extend the known range to the east, and provide a new maximum depth.

Conclusions

Zoogeography	Aleutian
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From eastern Kamchatka to Pervenets Canyon in the Bering Sea and from Stalemate Bank east to Graham Island, British Columbia
Depth	73 to 625 m

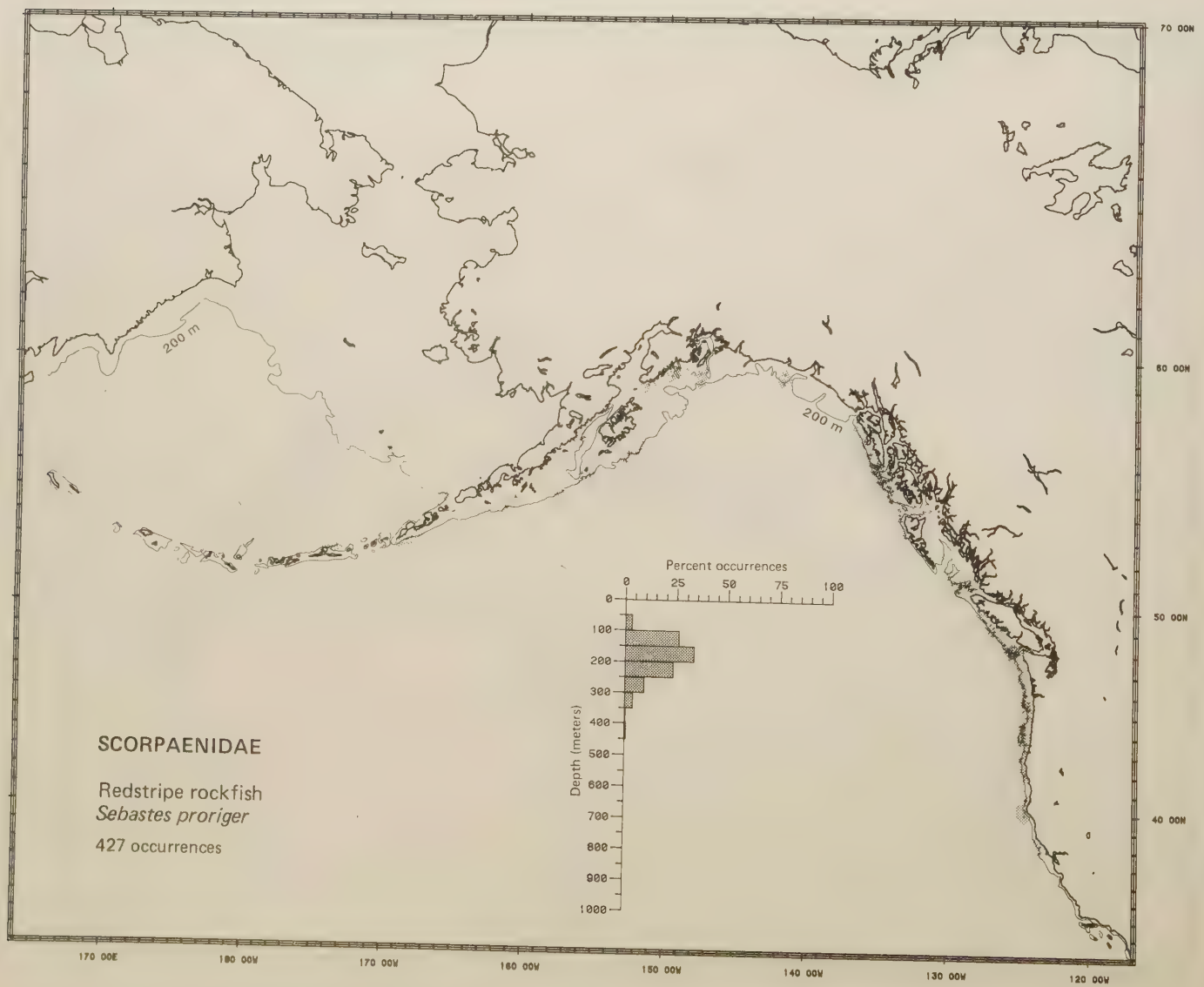


Literature Reported from the Bering Sea and Amchitka Island in the Aleutian Islands to San Diego (Miller and Lea 1972; Simenstad et al. 1977; Eschmeyer and Herald 1983) at depths of 12 to 366 m (Hart 1973; Eschmeyer and Herald 1983).

Survey data Taken from Pribilof Canyon in the southeastern Bering Sea and Atka Island in the Aleutian Islands to Bodega Bay, California. Depth range 75 to 425 m, most frequently (33.3% of occurrences) on the outer shelf from 150 to 200 m, and 95.5% of occurrences from depths of 100 to 350 m. Survey data provide a more precise range in the Bering Sea and a new maximum depth record.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Outer shelf-mesobenthal (outer shelf)
Range	From the Pribilof Canyon, Bering Sea, and Amchitka Island in the Aleutian Islands to San Diego, California
Depth	12 to 425 m



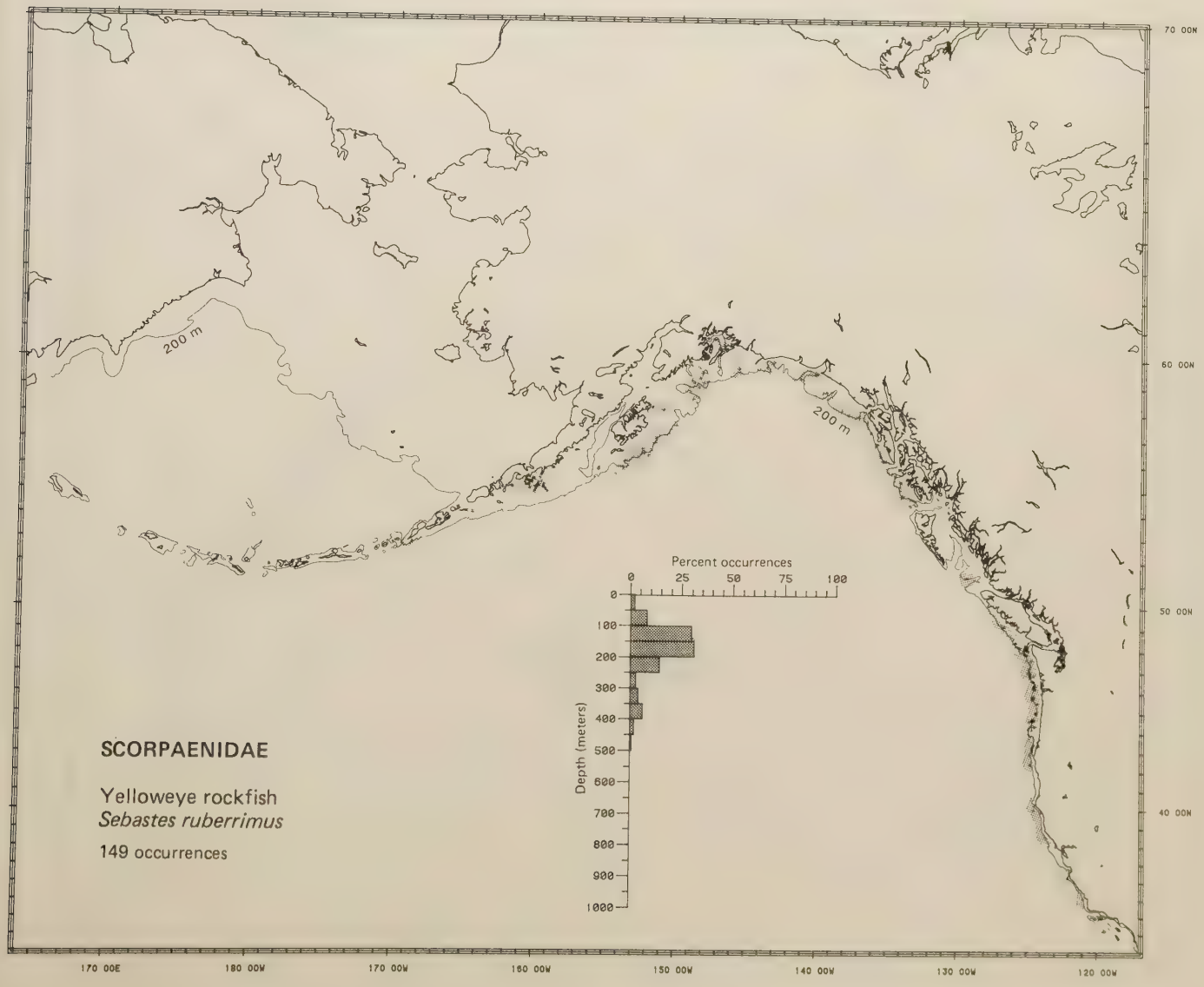
YELLOWEYE ROCKFISH, *Sebastes ruberrimus* (Cramer 1895)

Literature Reported from the Gulf of Alaska to Ensenada, Baja California, from 37 to 549 m in depth (Miller and Lea 1972; Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Umnak Island in the Aleutian Islands to San Luis Obispo, California. Depth range 25 to 475 m, most frequently (30.9% of occurrences) on the outer shelf from 150 to 200 m, and 95.3% of occurrences from depths of 50 to 400 m. Survey data provide a more precise distribution of this species in the Gulf of Alaska and a slightly shallower minimum depth.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Umnak Island, Alaska, to Ensenada, Baja California
Depth	25 to 549 m



FLAG ROCKFISH, *Sebastes rubrivinctus* (Jordan and Gilbert 1880) — Scorpaenidae: Scorpionfishes

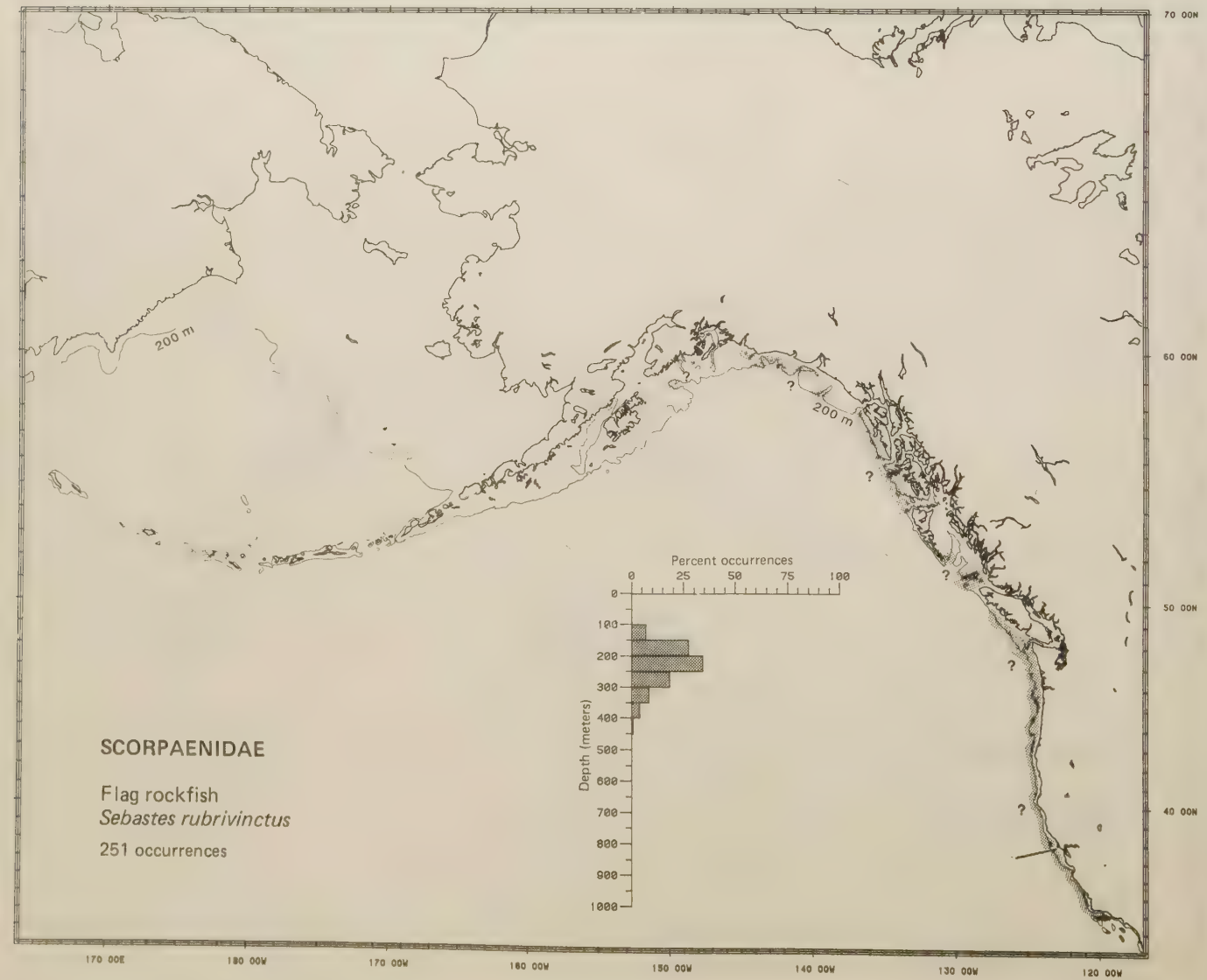
Taxonomic comment The redbanded rockfish, *Sebastes babcocki*, was considered to be the same species as the flag rockfish, with *babcocki* being a junior synonym of *rubrivinctus*, from 1928 to 1972. Rosenblatt and Chen (1972) presented evidence to separate the two as distinct species.

Literature Reported from San Francisco, California, to Cape San Quintin, Baja California (Miller and Lea 1972). Because of the confusion of redbanded rockfish with flag rockfish, probably all fish identified as flag rockfish north of San Francisco from 1928 to 1972 were redbanded rockfish (Rosenblatt and Chen 1972). The flag rockfish has been reported at depths of 0 to 302 m (Howe 1981).

Survey data From south of the Kenai Peninsula, Alaska, to the Santa Barbara Channel, California. Depth range 125 to 425 m, most frequently (34.3% of occurrences) on the upper slope between 200 and 250 m, and 95.2% of occurrences from depths <350 m. Survey data show a geographic range for this species that is misleading. Because the data include samples collected as far back as 1953, records of flag rockfish north of San Francisco (and possibly some south of there) were probably records of redbanded rockfish. The two species were probably correctly distinguished after the mid-1970's. It is also not certain how the confusion of these two species affects the depth frequency distribution found in the data. Thus the range of this species will be regarded conservatively as being that found in the literature.

Conclusions

Zoogeography	Oregonian-San Diegan
Life zone	Inner shelf-mesobenthal (mesobenthal)
Range	From San Francisco, California, to Cape San Quintin, Baja California
Depth	0 to 302 m (possibly to 425 m)



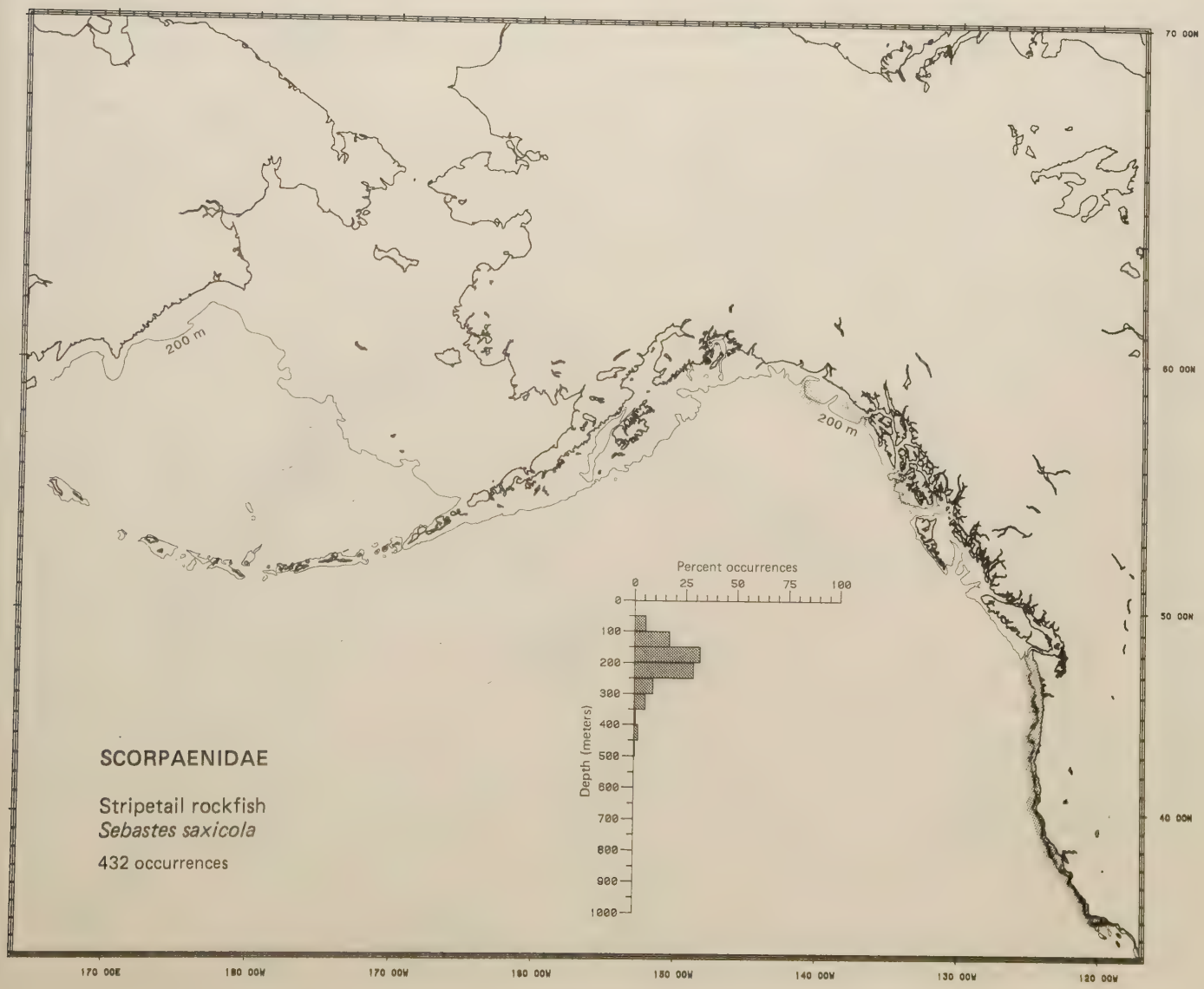
STRIPETAIL ROCKFISH, *Sebastes saxicola* (Gilbert 1890)

Literature Reported from southeastern Alaska to Rompiente Point, Baja California Sur (Miller and Lea 1972), at depths of 10 to 547 m (Howe 1981; Allen 1982).

Survey data Found from Yakutat Bay, Alaska, to the Santa Barbara Channel, California. Depth range 25 to 475 m, most frequently (31.9% of occurrences) on the outer shelf between 150 to 200 m, and 97.0% of occurrences from depths <350 m. Survey data provide a more precise northern limit in southeastern Alaska.

Conclusions

Zoogeography	Oregonian-San Diegan
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From Yakutat Bay, Alaska, to Rompiente Point, Baja California Sur
Depth	10 to 547 m



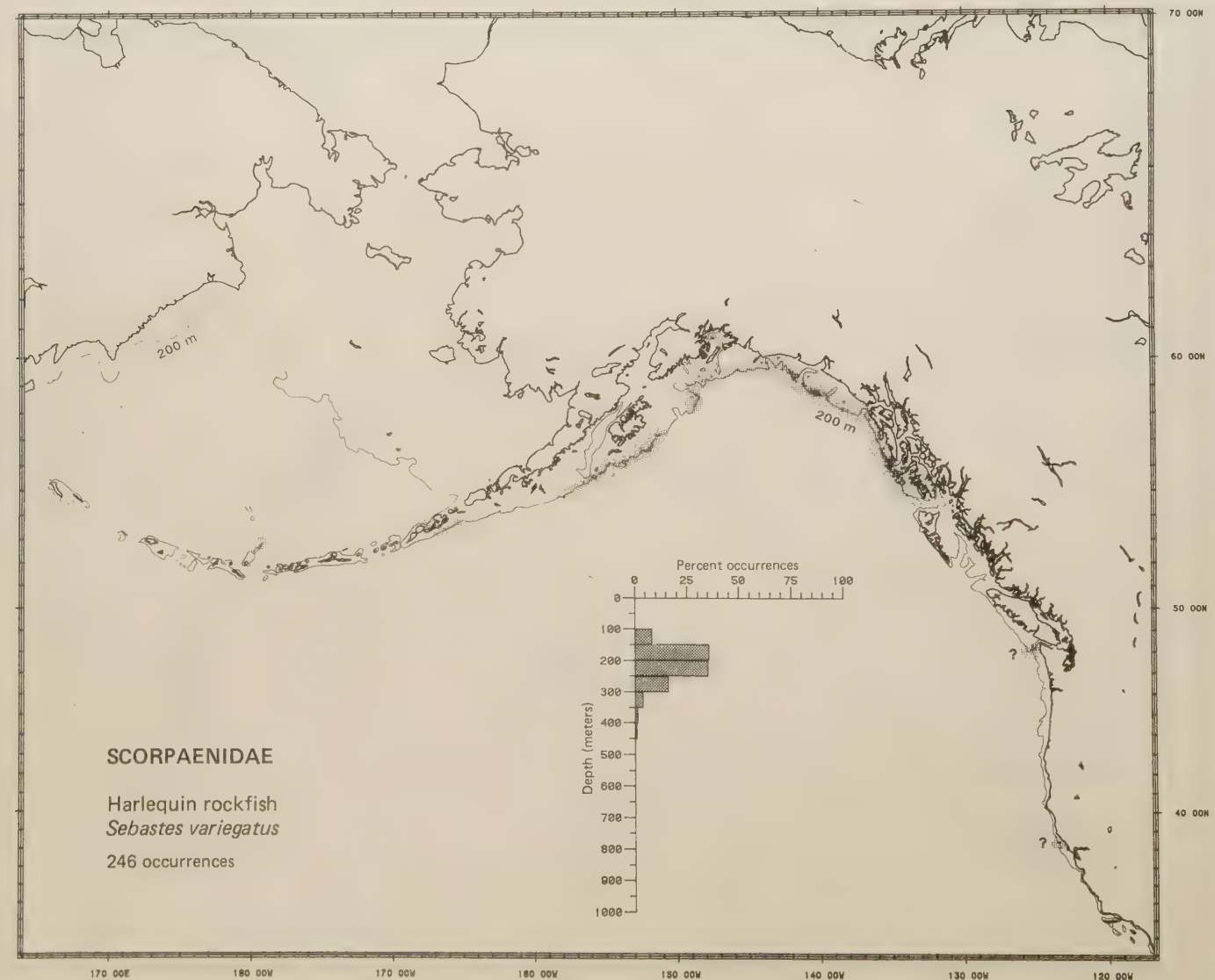
HARLEQUIN ROCKFISH, *Sebastes variegatus* Quast 1971

Literature Reported from Unimak Pass in the Aleutian Islands to Goose Island Bank in Queen Charlotte Sound, British Columbia (Hart 1973), at depths of 70 to 558 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Bowers Bank in the Aleutian Islands to Bodega Bay, California. Depth range 125 to 425 m, most frequently (35.4% of occurrences) on the outer shelf between 150 and 200 m, and 94.3% of occurrences from depths <300 m. Survey data extend the known range to the west in the Aleutians and to the south. Records of this species off Cape Flattery, Washington, and Bodega Bay, California, are regarded as questionable at this time.

Conclusions

Zoogeography	Aleutian
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From Bowers Bank in the Aleutians to Goose Island Bank, Queen Charlotte Sound, British Columbia (possibly to Bodega Bay, California)
Depth	70 to 558 m



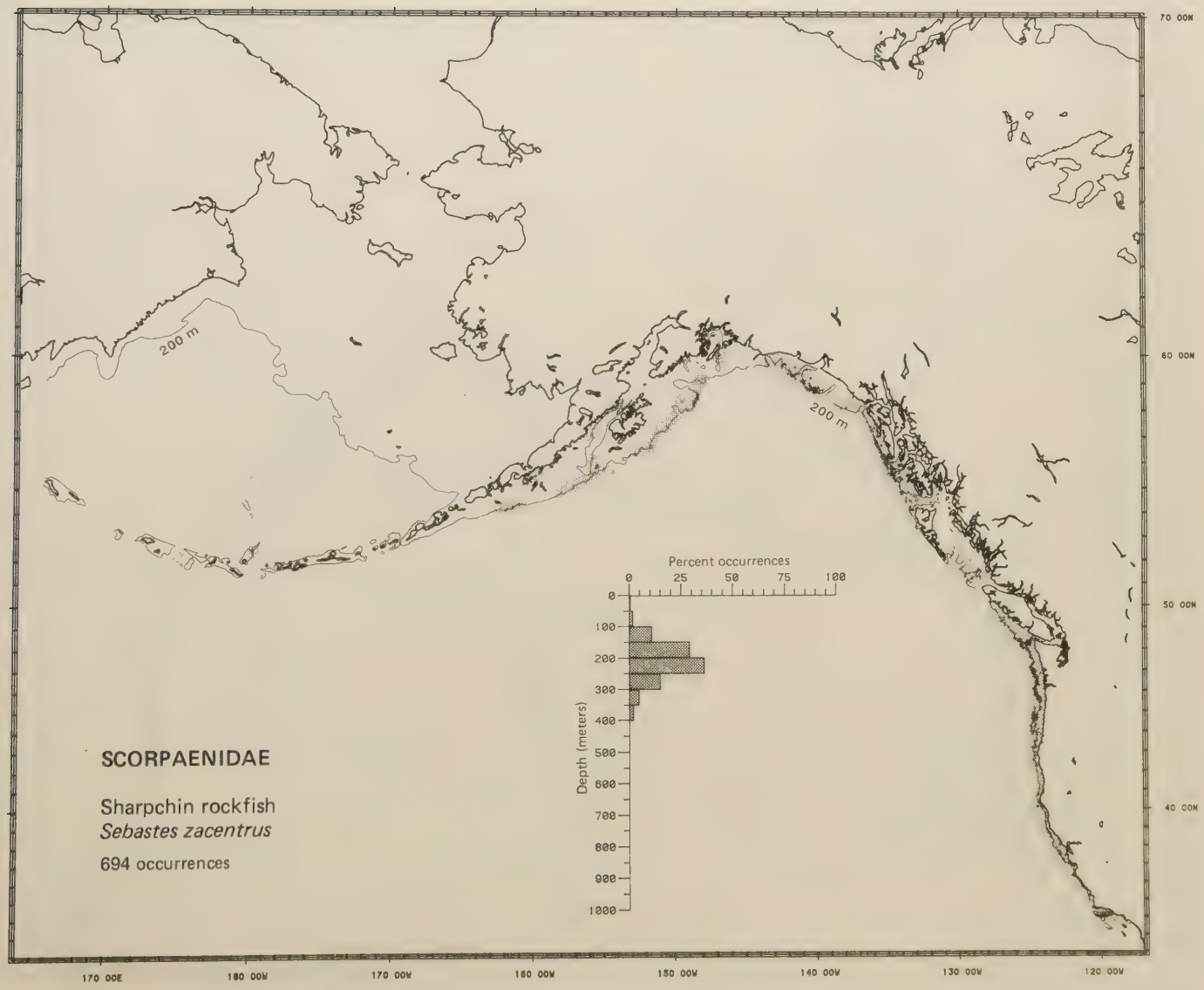
SHARPCHIN ROCKFISH, *Sebastes zacentrus* (Gilbert 1890)

Literature Reported from Sanak Island in the Gulf of Alaska to San Diego, California (Hart 1973), from 91 to 320 m in depth (Eschmeyer and Herald 1983).

Survey data Found from Semisopochnoi Island in the Aleutian Islands to the Santa Barbara Channel, California. Depth range 25 to 475 m, most frequently (36.3% of occurrences) on the upper slope between 200 and 250 m, and 95.6% of occurrences from depths of 100 to 350 m. Survey data extend the known range to the west and expand the known depth range.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Outer shelf-mesobenthal (mesobenthal)
Range	From Semisopochnoi Island in the Aleutian Islands to San Diego, California
Depth	25 to 475 m



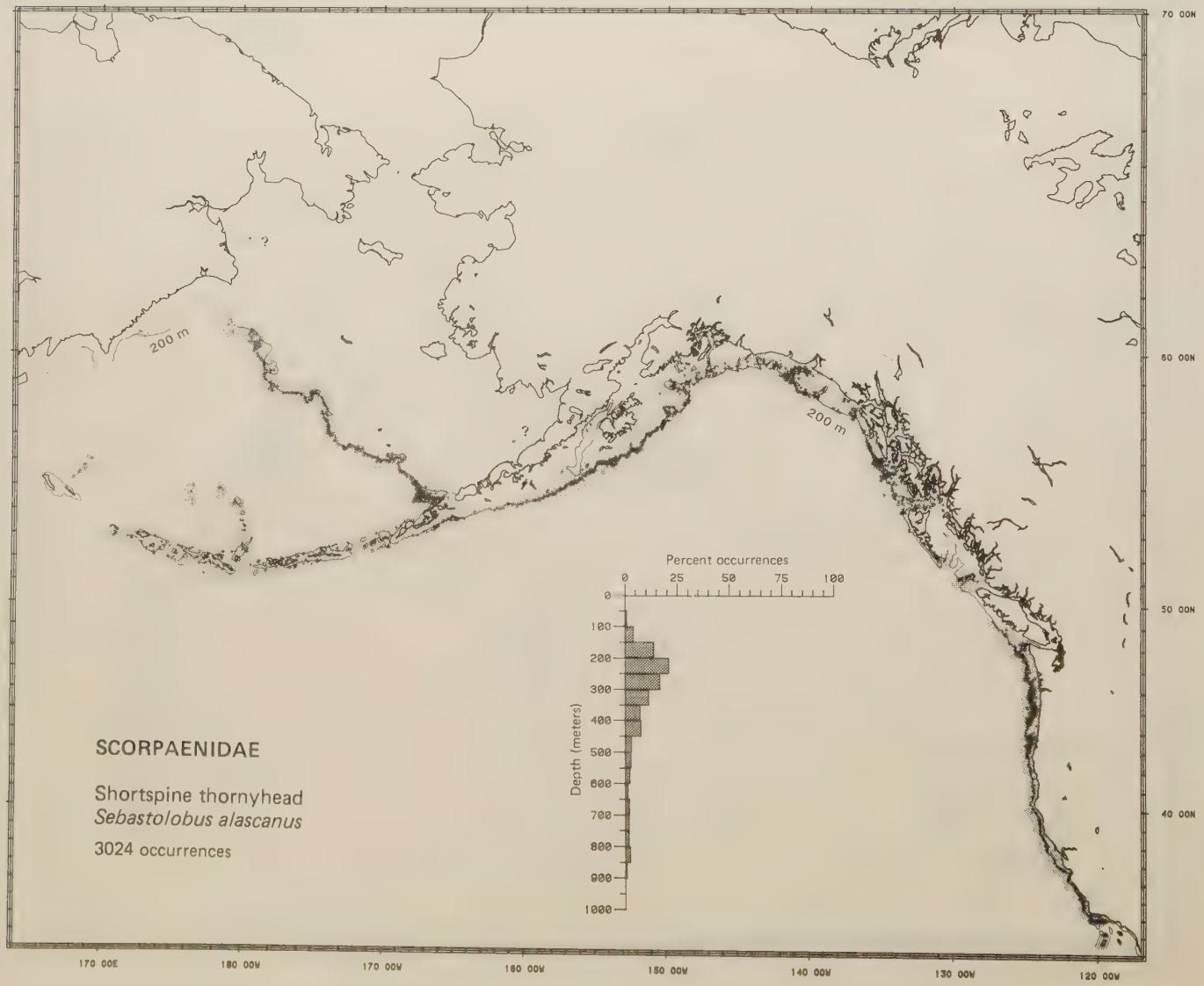
SHORTSPINE THORNYHEAD, *Sebastolobus alascanus* Bean 1890

Literature Reported from the Sea of Okhotsk, the Bering Sea, and Amchitka Island in the Aleutian Islands to Cedros Island, Baja California (Miller and Lea 1972; Hart 1973; Simenstad et al. 1977), at depths of 20 to 1524 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Medny Seamount and off Glubokaya Bay in the western Bering Sea, and from Navarin Canyon southeast along the slope of the eastern Bering Sea, west to Stalemate Bank and the Ulm Plateau in the Aleutian Islands, and southeast to off San Nicolas Island, California. May have been taken at shallow depths in the Gulf of Anadyr and Bristol Bay. Depth of capture ranged from 25 to 1275 m, with 20.8% of occurrences on the upper slope between 200 and 250 m, and 95.5% of occurrences from depths of 100 to 800 m. Survey data provide a more precise distribution in the Bering Sea and extend the known range in the Aleutian Islands.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Outer shelf-bathybenthal (mesobenthal)
Range	From the Sea of Okhotsk north to Navarin Canyon (and possibly the Anadyr Gulf) in the Bering Sea and from Stalemate Bank and Ulm Plateau in the Aleutian Islands southeast to Cedros Island, Baja California
Depth	20 to 1524 m

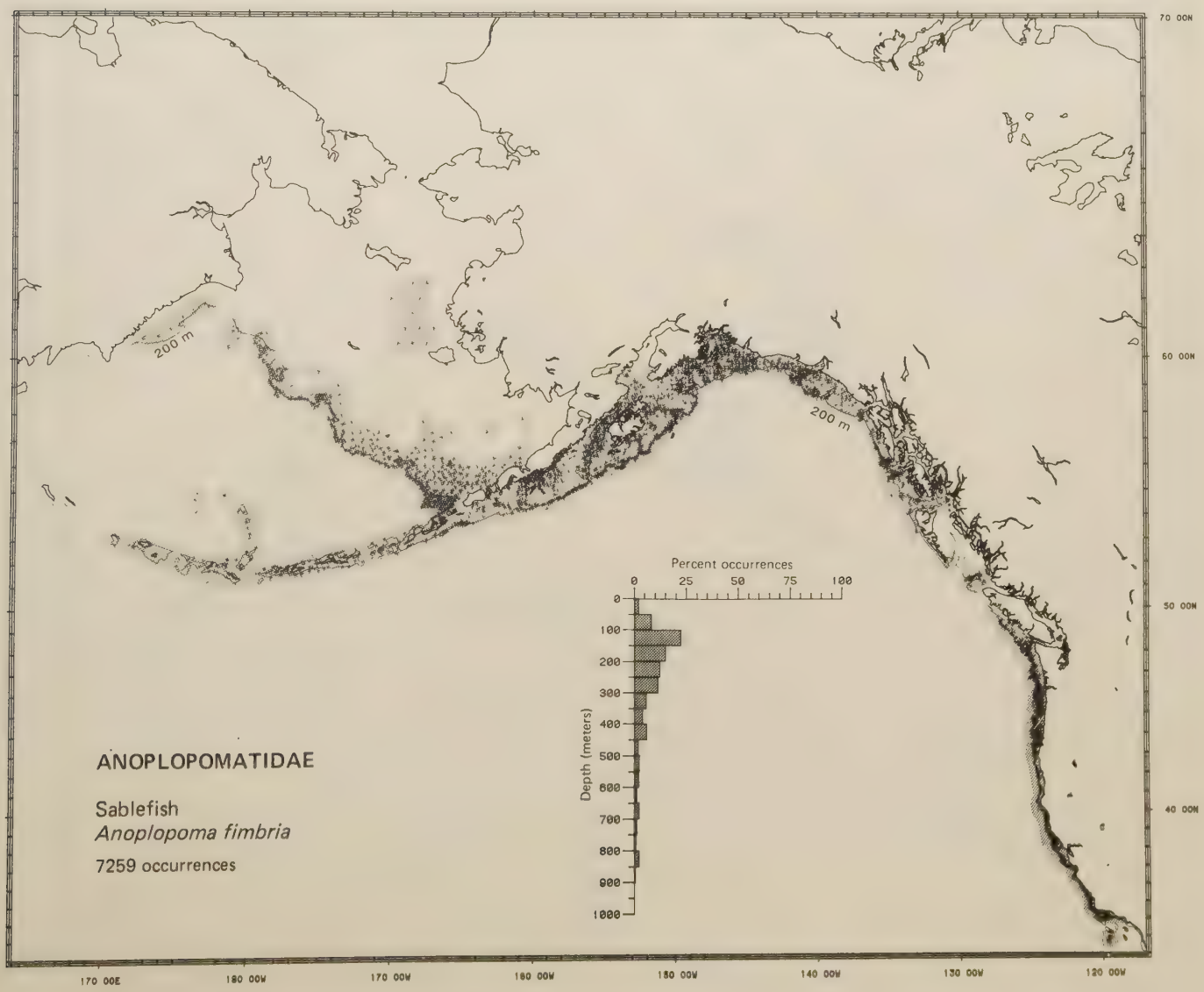


Literature Reported from east-central Honshu, Japan (but not in the Sea of Okhotsk), north to Cape Olyutorski in the Bering Sea, throughout the Aleutian Islands, and south to Cedros Island, Baja California (Shmidt 1950; Quast and Hall 1972; Hart 1973; Sasaki 1985). Only adults have been found in the western Pacific, suggesting that this region is not an important part of the range of the species (Sasaki 1985). Reported at depths of 0 to 2740 m (Howe 1981; McFarlane and Beamish 1983).

Survey data Found from Medny Seamount and off Glubokaya Bay north to off Cape Navarin, southeast along the outer shelf and slope of the eastern Bering Sea (and in an isolated area southeast of Saint Lawrence Island), west in the Aleutian Islands to Stalemate Bank and Ulm Plateau, and southeast to the Patton Escarpment off San Nicolas Island in southern California. Depth range 25 to 1325 m, most frequently (22.2% of occurrences) on the outer shelf from 100 to 150 m, and 95.1% of occurrences from depths <700 m. Survey data provide a more precise northern limit in the Bering Sea. It should be noted that sablefish occur on a number of seamounts in the Aleutian Basin.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-bathybenthal (outer shelf)
Range	From east-central Honshu, Japan, north to the Bering Sea (but not in the Sea of Okhotsk), southeast of Saint Lawrence Island, and from the Aleutian Islands to Cedros Island, Baja California
Depth	0 to 2740 m

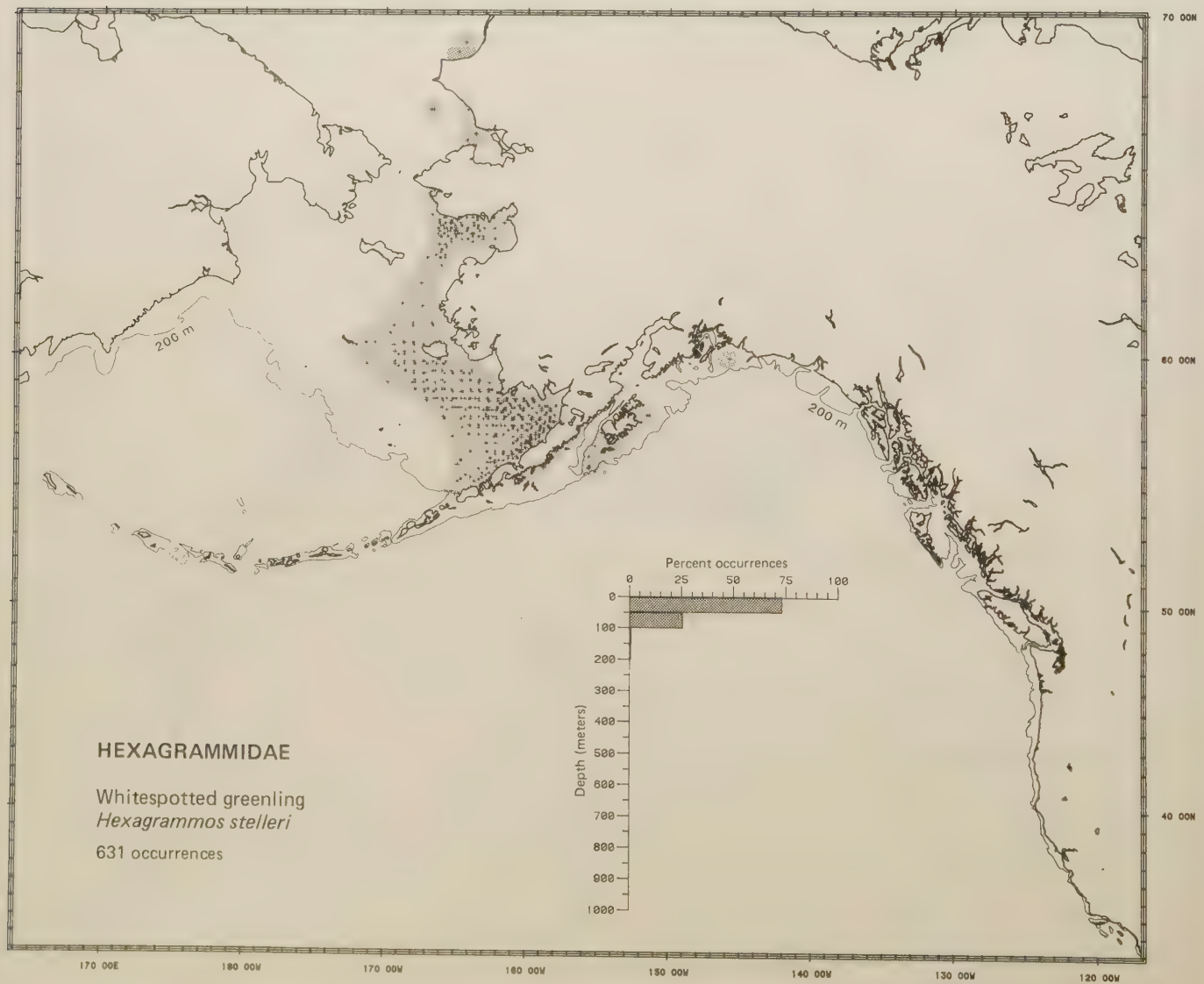


Literature Reported from Peter the Great Bay, U.S.S.R., in the Sea of Japan, north to the Chukchi Sea, and south to Oregon (Andriyashev 1954; Howe 1981), at depths of intertidal zone to 48 m (Rutenberg 1962; Howe 1981).

Survey data Occurred in catches from northeast of Cape Lisburne in the Chukchi Sea south along the Alaska coast of the eastern Bering Sea to Unimak Island in the Aleutian Islands and from there east to Cordova, Alaska, in the northern Gulf of Alaska. Depth range 25 to 475 m, most frequently (73.1% of occurrences) on the inner shelf between 0 and 50 m, and 98.6% of occurrences from depths <100 m. Survey data provide a more precise northern limit in the Chukchi Sea and a new maximum depth record. However, the record at 475 m appears anomalous and may represent the capture of a pelagic juvenile from near the surface but above this depth. The next greatest depth of occurrence was at 175 m.

Conclusions

Zoogeography	Arctic-circumboreal Pacific
Life zone	Inner shelf-middle shelf (inner shelf)
Range	From Peter the Great Bay, U.S.S.R., in the Sea of Japan, to northeast of Cape Lisburne in the Chukchi Sea, west to Unimak Island in the Aleutian Islands, and Oregon
Depth	Intertidal zone to 175 m (possibly to 475 m)



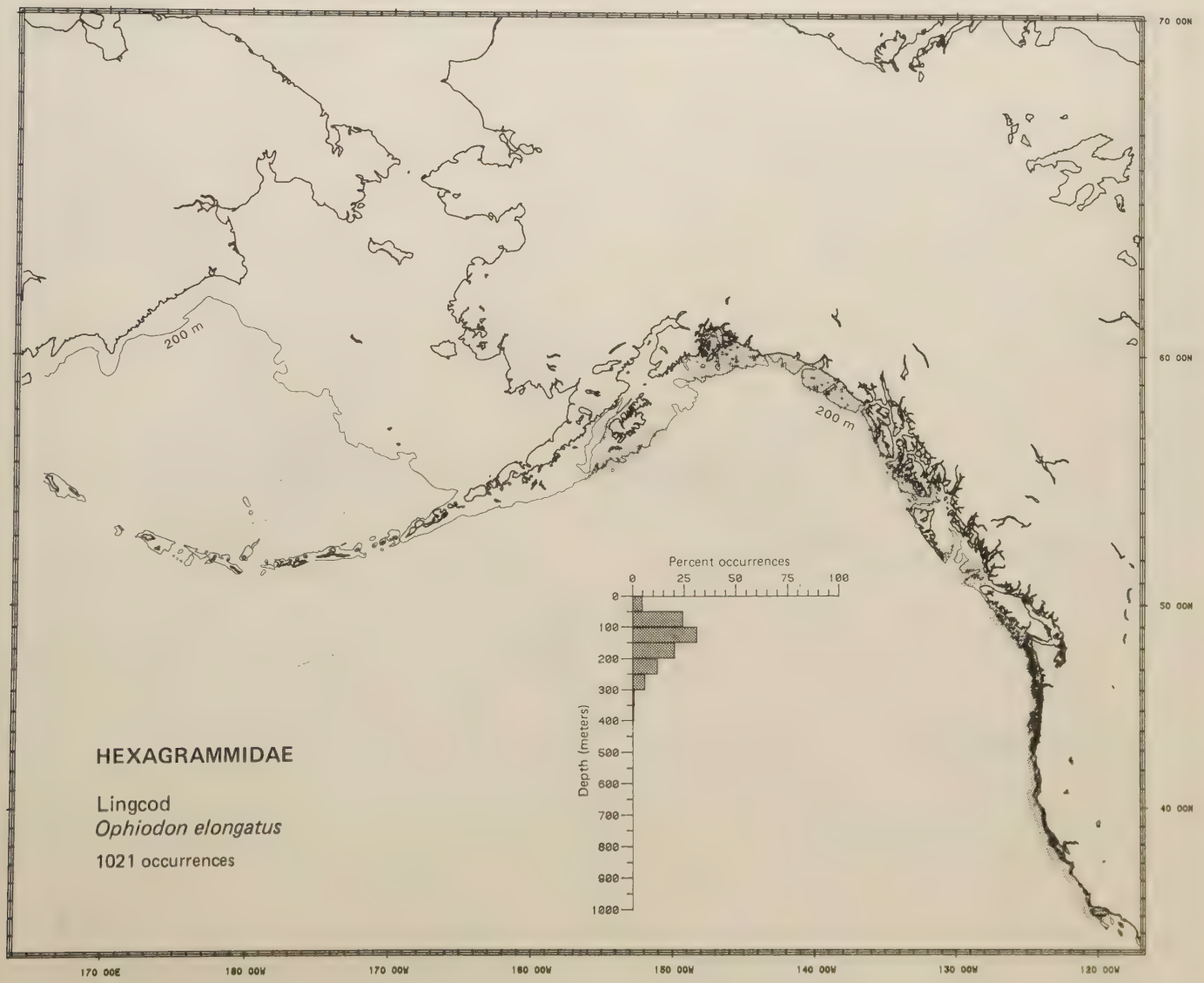
LINGCOD, *Ophiodon elongatus* Girard 1854

Literature Reported from the Shumagin Islands in the western Gulf of Alaska (and possibly the Bering Sea) to Ensenada, Baja California (Quast and Hall 1972; Hart 1973), and in depth from the intertidal zone to 427 m (Howe 1981; Garrison and Miller 1982; Eschmeyer and Herald 1983).

Survey data Found from southwest of Chirikof Island (south of Shelikof Strait) in the Gulf of Alaska to Santa Cruz Island, California. Depth range 25 to 475 m, most frequently (31.1% of occurrences) on the outer shelf between 100 and 150 m, and 98.3% of occurrences from depths < 300 m. Survey data provide a new maximum depth record.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Estuarine-mesobenthal (outer shelf)
Range	From the Shumagin Islands in the western Gulf of Alaska (possibly the Bering Sea) to Ensenada, Baja California
Depth	Intertidal zone to 475 m



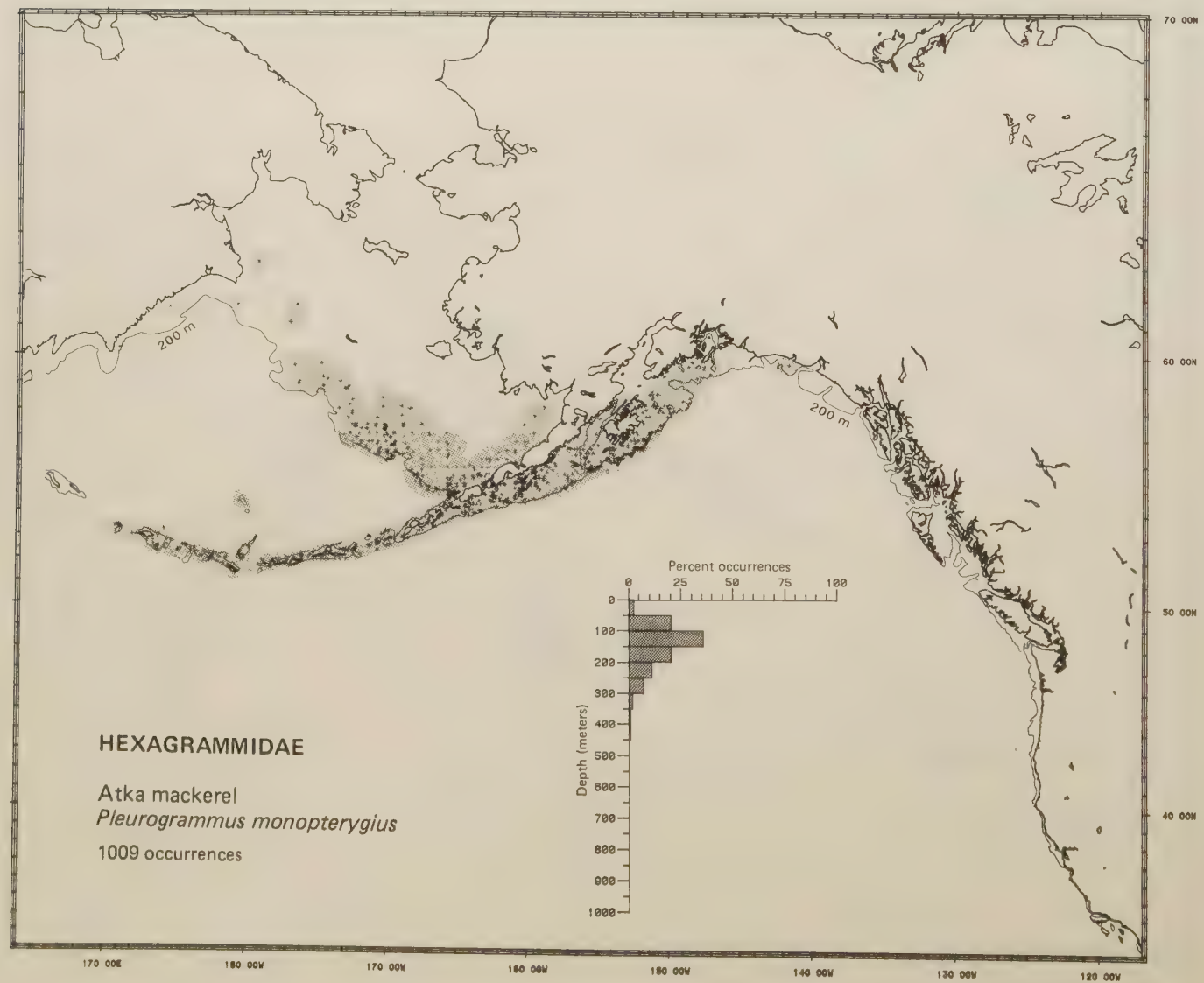
ATKA MACKEREL, *Pleurogrammus monopterygius* (Pallas 1810)

Literature Reported from the Yellow Sea to Cape Olyutorski in the Bering Sea and along the Commander and Aleutian Islands to Redondo Beach, California (Rutenberg 1962; Okada and Kobayashi 1968; Eschmeyer and Herald 1983). It is rare south of Alaska (Rutenberg 1962). In depth, reported from the lower intertidal zone to 250 m (Rutenberg 1962; Fedorov 1973a).

Survey data Found from Cape Olyutorski in the western Bering Sea north to northeast of Cape Navarin, southeast along the outer shelf and slope of the eastern Bering Sea to Bristol Bay, west in the Aleutian Islands to Stalemate Bank and Bowers Bank, and east to Icy Bay in the northern Gulf of Alaska. Depth range 25 to 575 m, most frequently (35.6% of occurrences) on the outer shelf between 100 and 150 m, and 96.5% of occurrences from depths ⩽300 m. Survey data provide a more precise northern limit in the Bering Sea and a new maximum depth record.

Conclusions

Zoogeography	Northwestern boreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From the Yellow Sea to Cape Navarin in the Bering Sea and from Stalemate Bank and Bowers Bank in the Aleutian Islands to Icy Bay, Alaska, rarely to Redondo Beach, California
Depth	Lower intertidal zone to 575 m



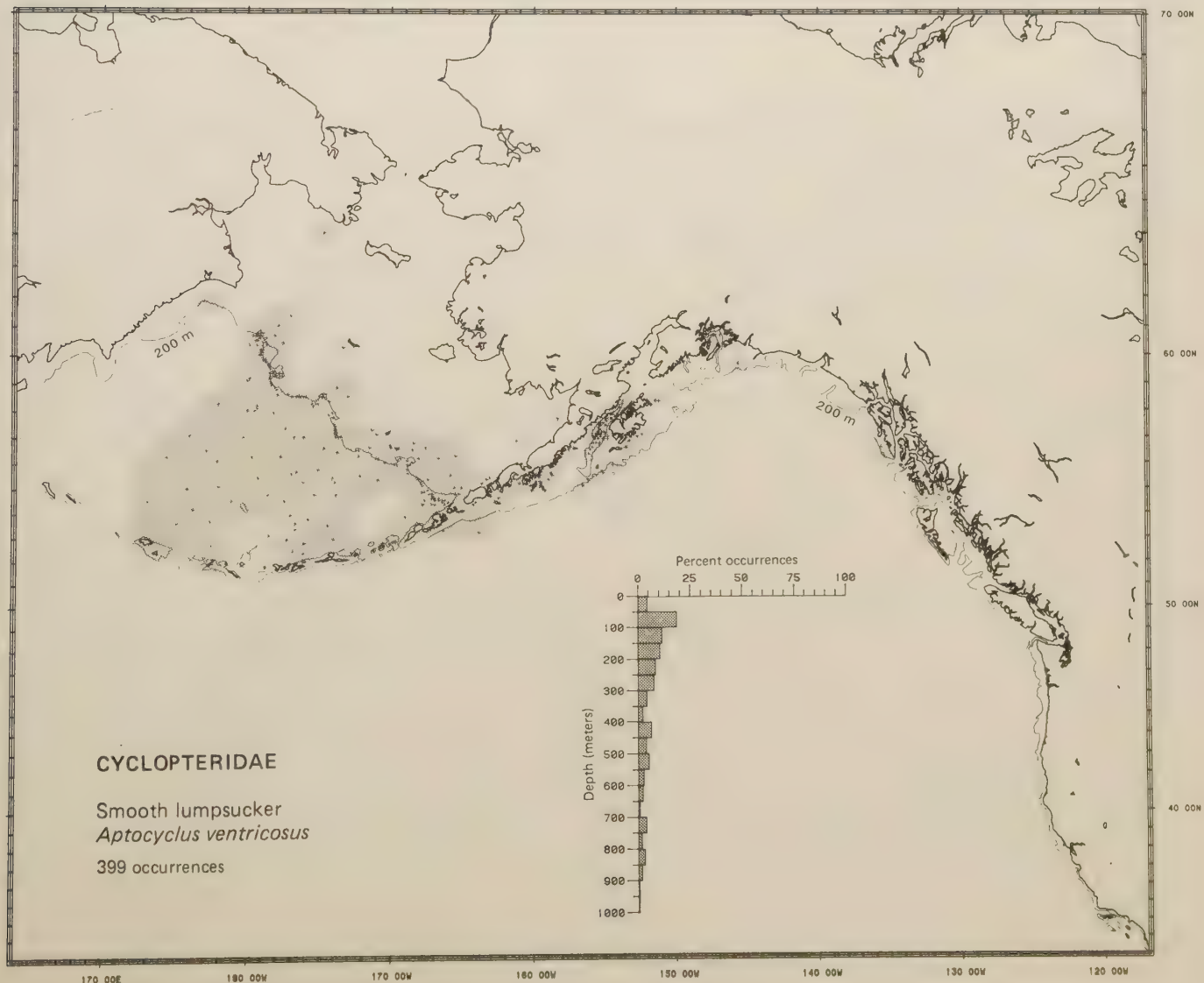
SMOOTH LUMPSUCKER, *Aptocyclus ventricosus* (Pallas 1769)

Literature Reported from Pusan, South Korea, to the Anadyr Gulf in the Bering Sea (outside the Sea of Okhotsk), throughout the Commander and Aleutian Islands, and southeast to Mathieson Channel, British Columbia (Shmidt 1950; Wilimovsky 1964; Ueno 1970; Quast and Hall 1972; Hart 1973), at depths of 0 to 1500 m (Fedorov 1973a).

Survey data Found from southwest of Providence Bay on the Chukchi Peninsula to Attu Island in the Aleutian Islands, occurring primarily over the outer shelf and slope of the eastern Bering Sea and pelagically across the Aleutian Basin, and from the Aleutian Islands east to Baranof Island in southeastern Alaska. Depth range 25 to 975 m, most frequently (18.5% of occurrences) between 50 and 100 m, and 97.2% of occurrences from depths <850 m. Survey data show a distinct midwater distribution of this species across the Aleutian Basin. Since the species appears to occur pelagically with a modal depth of occurrence at 75 m, trawls made at greater depths may have actually captured the species nearer the surface than at the depth of tow.

Conclusions

Zoogeography	Kurile-Aleutian
Life zone	Neritic-mesopelagic (neritic)
Range	From Pusan, South Korea, north (outside the Sea of Okhotsk) to Providence Bay in the Anadyr Gulf of the Bering Sea, throughout the Aleutian Basin and Islands, and southeast to Mathieson Channel, British Columbia
Depth	0 to 1500 m

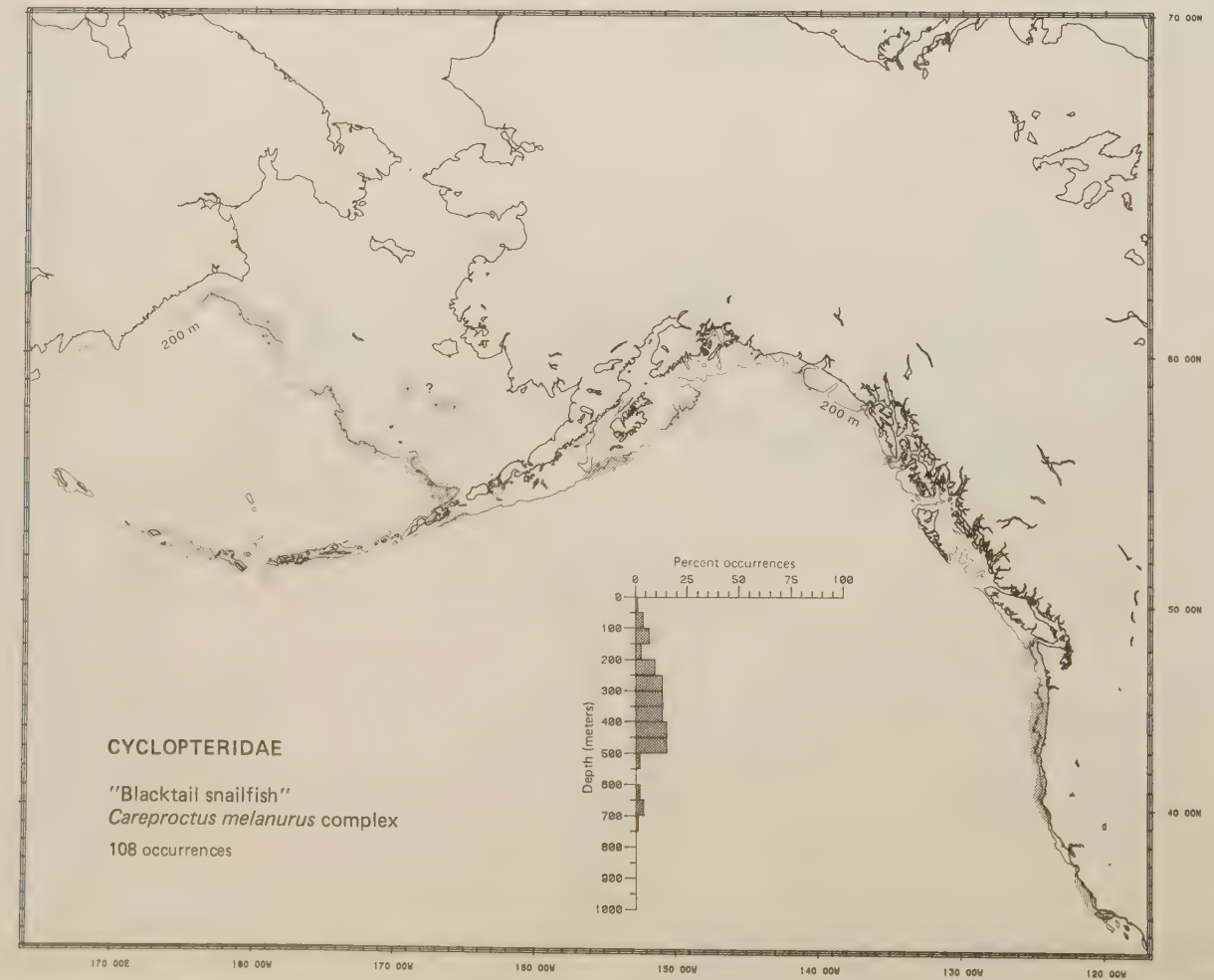


Taxonomic comment This complex may include four species that have been called "blacktail snailfish" in the field, including the following: Alaska snailfish, *Careproctus colletti* Gilbert 1896; blackfinned snailfish, *C. cypselurus*(Jordan and Gilbert 1898 *in* Jordan and Evermann); forktail snailfish, *C. furcellus* Gilbert and Burke 1912; and the blacktail snailfish, *C. melanurus* Gilbert 1892. Good field characters for distinguishing these species have not been established.

Literature The Alaska snailfish ranges from the Sea of Japan to the Bering Sea and from there to the slope south of the Alaska Peninsula at depths of 510 to 1350 m (Quast and Hall 1972; Fedorov 1973a; Baxter 1985). The blackfinned snailfish occurs from Sakhalin, U.S.S.R., to the Bering Sea and from there to Oregon at depths of 640 to 1775 m (Shmidt 1950; Quast and Hall 1972; Fedorov 1973a). The forktail snailfish is found from Sakhalin to the Bering Sea at 98 to 882 m (Shmidt 1950; Quast and Hall 1972; Fedorov 1973a; Baxter 1985). The blacktail snailfish has been reported from the Bering Sea and Unalaska Island to San Diego at 89 to 2286 m (Miller and Lea 1972; Quast and Hall 1972; Howe 1981; Eschmeyer and Herald 1983).

Survey data The "blacktail smailfish" complex was found from south of Cape Navarin southeast along the slope of the eastern Bering Sea to Akutan Island, west in the Aleutian Islands to Kiska Island, and southeast to Santa Barbara, California, at depths of 25 to 725 m, most frequently (29.6% of occurrences) on the upper middle slope between 400 and 500 m, and 94.5% of occurrences from depths of 50 to 650 m. Survey data for this complex of species cannot be used to describe range limits. The data, however, do define the distribution of the complex in the Bering Sea and may be of use to future taxonomic and ecological studies. It is not certain which species is dominant in the Bering Sea although it may be the blackfinned snailfish (Kessler 1985). Most records south of Oregon probably refer to the blacktail snailfish.

Conclusions The "blacktail snailfish" complex probably consists of at least four boreal Pacific, sublittoral and bathyal species that need to be accurately identified in field collections before any conclusion concerning the distribution of individual species can be reached.

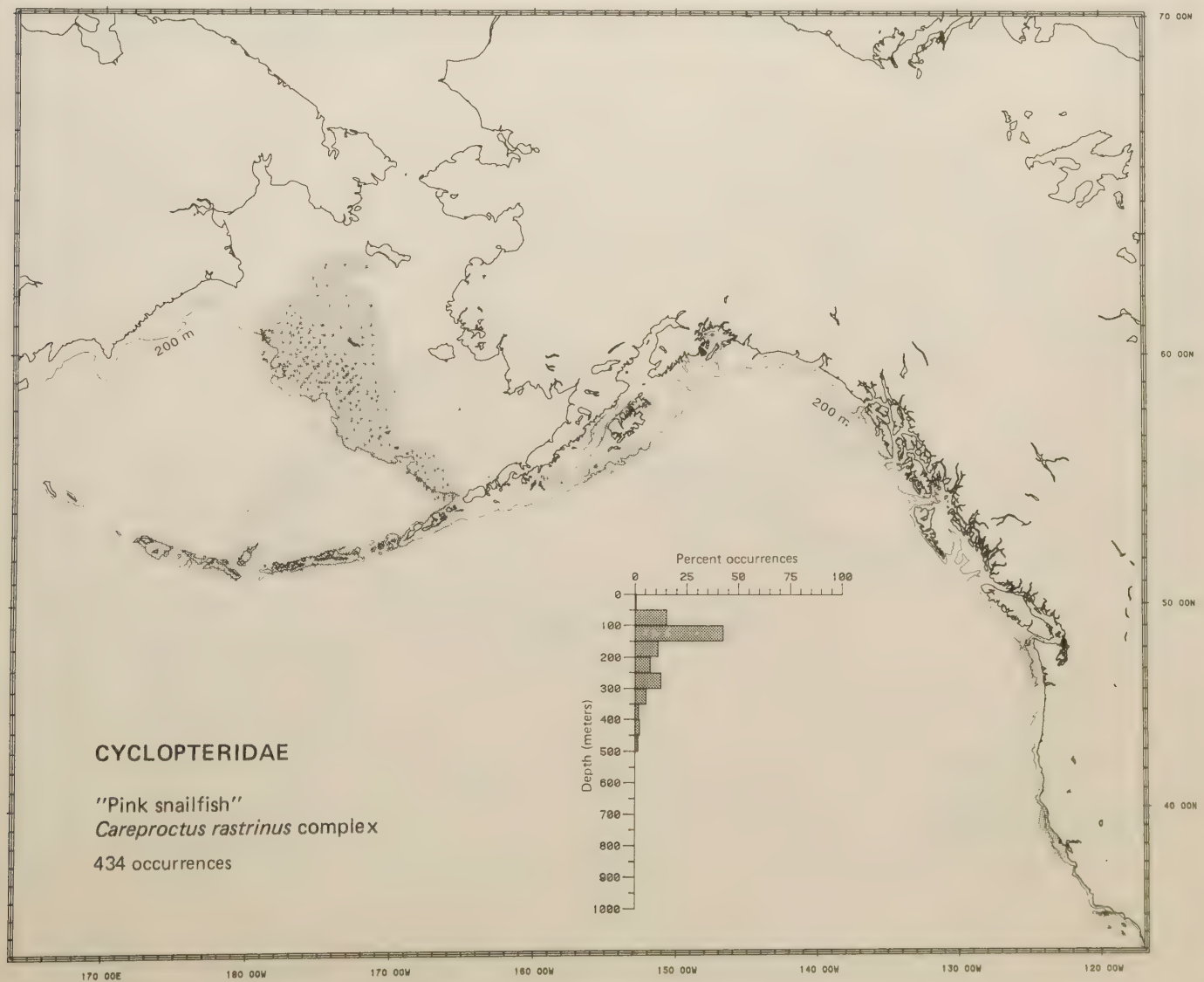


Taxonomic comment This complex may include four or more species that have been called "pink snailfish" in the field, including the following: pink snailfish, *Careproctus osborni* (Townsend and Nichols 1925); monster snailfish, *C. phasma* Gilbert 1896; salmon snailfish, *C. rastrinus* Gilbert and Burke 1912; and peachskin snailfish, *C. scottae* Chapman and DeLacy 1939. Good field characters for distinguishing these species have not been established.

Literature The salmon snailfish ranges from Sakhalin, U.S.S.R., in the Sea of Okhotsk to the Bering Sea and from there to southeast Alaska at depths of 116 to 640 m (Quast and Hall 1972; Fedorov 1973a). The monster snailfish occurs from western Kamchatka to Bristol Bay and west in the Aleutian Islands to Amchitka Island at 84 to 504 m (Shmidt 1950; Simenstad et al. 1977). The peachskin snailfish is found from the western Bering Sea to southeast Alaska with a known depth of occurrence at 183 m (Chapman and DeLacy 1934; Baxter 1985; Kessler 1985). The pink snailfish occurs off central and southern California at 805 m (Townsend and Nichols 1925; Howe 1981).

Survey data The "pink snailfish" complex was found from Saint Lawrence Island in the eastern Bering Sea to Navarin Canyon and southeast along the outer shelf and slope to Unimak Island, west in the Aleutian Islands to Attu Island, and southeast to San Francisco Bay, California, at depths of 25 to 825 m, most frequently (42.4% of occurrences) on the outer shelf between 100 and 150 m, and 95.6% of occurrences from depths of 50 to 400 m. Survey data for this complex of species cannot be used to describe range limits, although they do define the distribution of the complex in the Bering Sea and may be of use to future taxonomic and ecological studies. The salmon snailfish is probably the most abundant species in the Bering Sea and the data presented here primarily describe the distribution of that species. However, records from California probably are those of the pink snailfish.

Conclusions The "pink snailfish" complex probably consists of at least four boreal Pacific, sublittoral and bathyal species that need to be accurately identified in field collections before any conclusion concerning the distribution of the individual species can be reached.



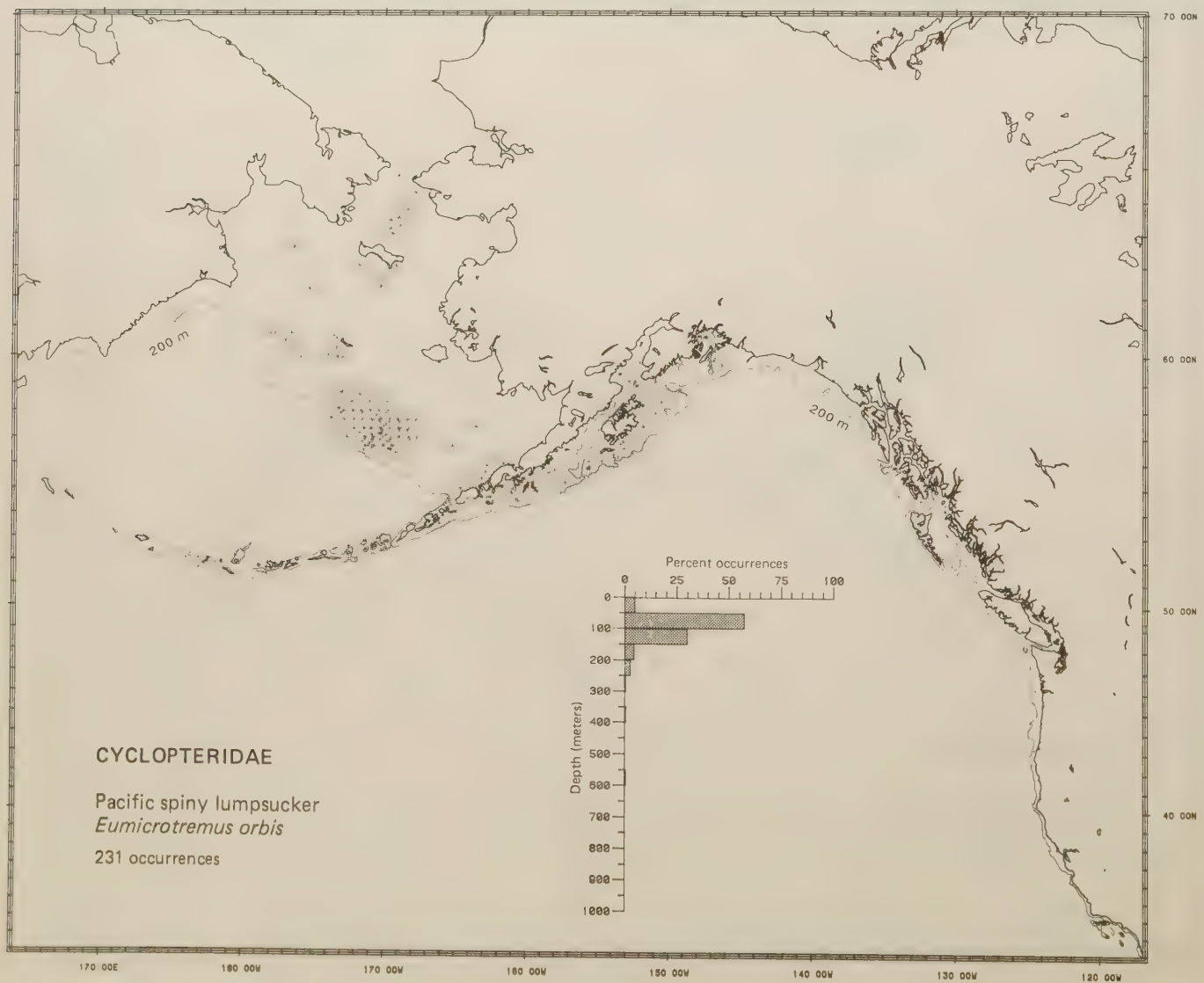
PACIFIC SPINY LUMPSUCKER, *Eumicrotremus orbis* (Günther 1896)

Literature Reported from Muroran, Hokkaido, Japan, and the Sea of Okhotsk to the Chukchi Sea, occurring west along the Aleutian Islands to Amchitka Island and east to Puget Sound, Washington (Ueno 1970; Quast and Hall 1972; Simenstad et al. 1977; Eschmeyer and Herald 1983), at depths of 0 to 240 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from off Cape Nizkiy (on the Korak Coast of the western Bering Sea) to the Bering Strait, south in the eastern Bering Sea to the Alaska Peninsula and Unimak Island, west in the Aleutian Islands to Peterel Bank, and east to South Baranof Island in southeastern Alaska. Depth range 25 to 575 m, most frequently (57.1% of occurrences) on the middle shelf between 50 and 100 m, and 96.1% of occurrences from depths <200 m. Survey data provide a new maximum depth record.

Conclusions

Zoogeography	Arctic-northern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Muroran, Hokkaido, Japan, and the Sea of Okhotsk, Amchitka Island in the Aleutian Islands, and Puget Sound, Washington, north to the Chukchi Sea
Depth	0 to 575 m

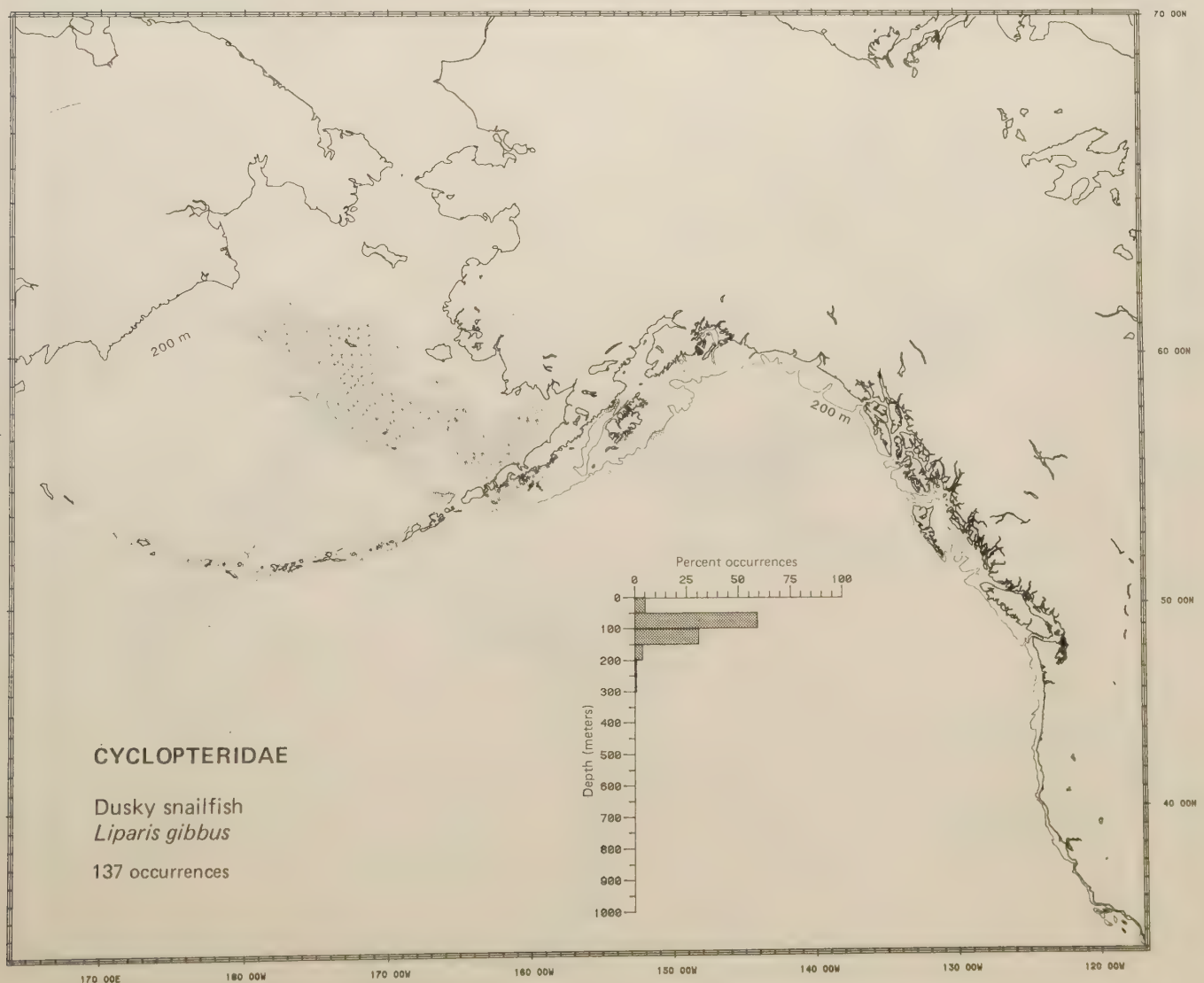


Literature Reported from Avacha Bay in southeastern Kamchatka to southeastern Alaska, west to Unalaska Island, north along the Alaskan coast of the Bering Sea, across the Canadian Arctic and south in the North Atlantic to Nova Scotia (Able and McAllister 1980), at depths of 25 to 366 m (Able and McAllister 1980; Eschmeyer and Herald 1983).

Survey data Found from onshore of Navarin Canyon in the eastern Bering Sea, southeast to the Alaska Peninsula and off Akutan Island, and east in the Gulf of Alaska to southeast of Kodiak Island. Depth range 25 to 275 m, most frequently (59.1% of occurrences) on the middle shelf between 50 and 100 m, and 94.9% of occurrences from depths ⩽150 m. Survey data do not extend the known range, either geographically or in depth. All records plotted here were recorded in the field as the marbled snailfish, *Liparis dennyi* Jordan and Starks 1895. However, all *Liparis* taken in the eastern Bering Sea during 1983 proved to be dusky snailfish; hence, it is assumed that most records for marbled snailfish were probably records of dusky snailfish.

Conclusions

Zoogeography	Arctic-western boreal Atlantic
Life zone	Inner shelf-outer shelf (middle shelf)
Ranges	From Avacha Bay in southeastern Kamchatka, Unalaska Island in the Aleutian Islands, and southeastern Alaska north along the Canadian Arctic to Nova Scotia in the western North Atlantic
Depth	25 to 366 m



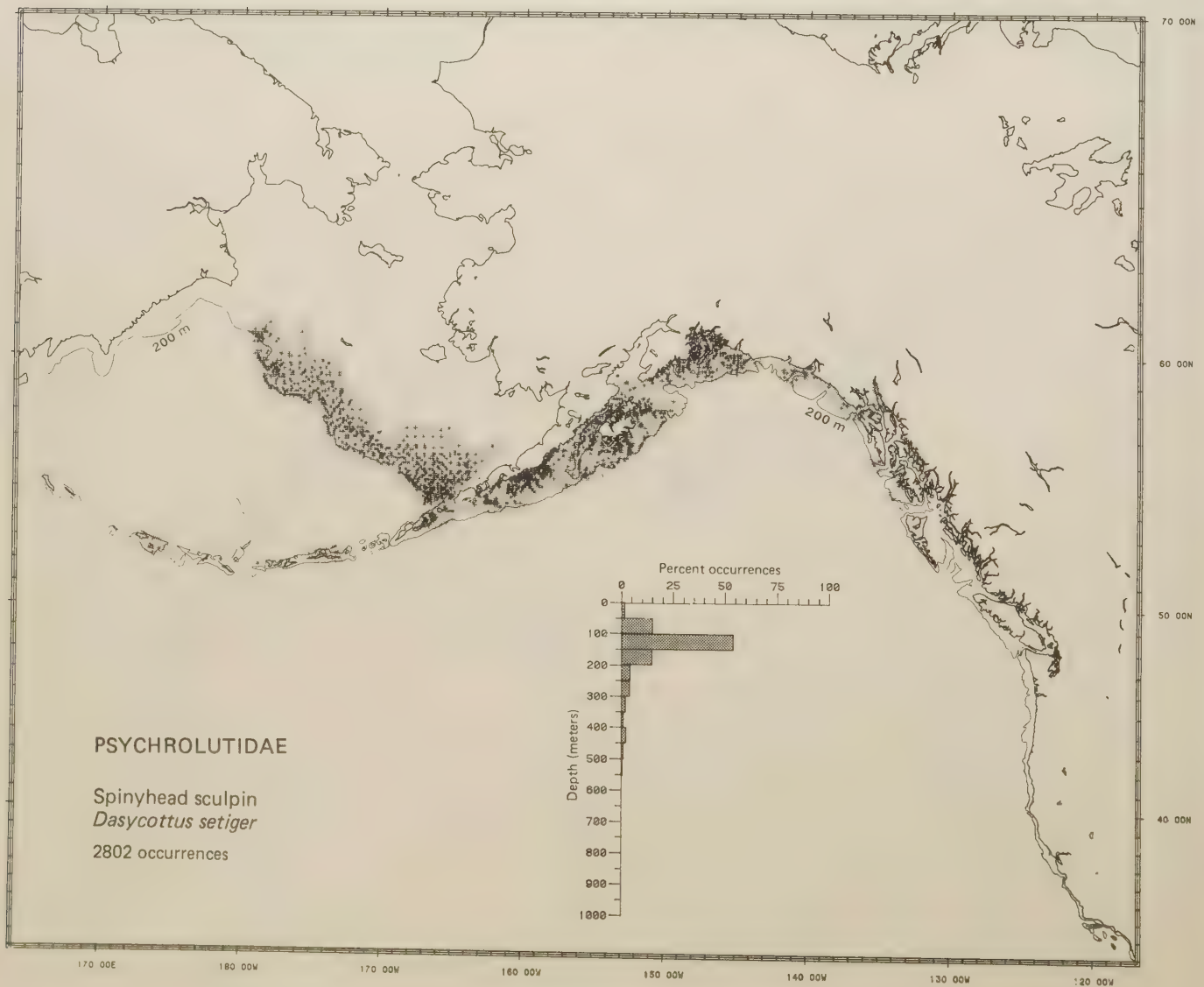
SPINYHEAD SCULPIN, *Dasycottus setiger* Bean 1890

Literature Reported from the Tatar Strait and Honshu in the Sea of Japan and the Sea of Okhotsk to the Bering Sea and from Unalaska Island in the Aleutian Islands southeast to Washington (Wilimovsky 1964; Okada and Kobayashi 1968; Quast and Hall 1972; Eschmeyer and Herald 1983), at depths of 18 to 750 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from Navarin Canyon on the northwestern slope of the eastern Bering Sea and from Attu Island in the Aleutian Islands east to Dall Island in southeast Alaska. Depth range 25 to 825 m, most frequently (53.8% of occurrences) on the outer shelf from 100 to 150 m, and 96.7% of occurrences from depths of 50 to 450 m. Survey data provide a more precise northern limit in the Bering Sea, extend the known range westward in the Aleutian Islands, and provide a new maximum depth record.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From the Sea of Japan off Honshu to Navarin Canyon in the Bering Sea, west to Attu Island in the Aleutian Islands, and southeast to Washington
Depth	18 to 825 m



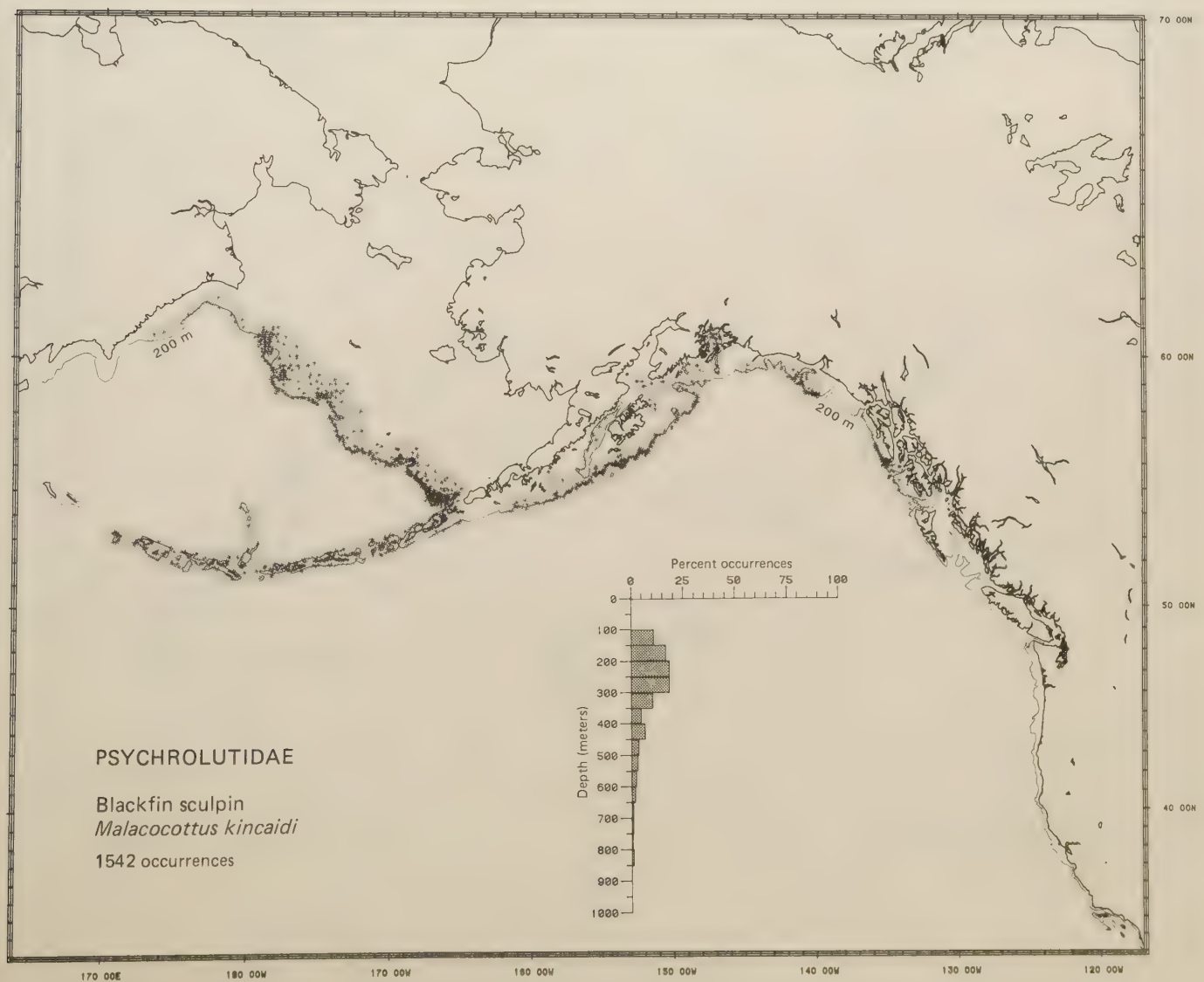
BLACKFIN SCULPIN, *Malacocottus kincaidi* Gilbert and Thompson 1905 — Psychrolutidae: Soft Sculpins

Literature Reported from Hokkaido, Japan, and the Sea of Okhotsk north to the southern Bering Sea, west in the Aleutian Islands to Amchitka Island, and east to Puget Sound, Washington (Shmidt 1950; Quast and Hall 1972; Simenstad et al. 1977; Eschmeyer and Herald 1983), at depths of 27 to 275 m (Eschmeyer and Herald 1983).

Survey data Found from off Natalii Bay (on the Korak Coast of the western Bering Sea) north to Cape Navarin, southeast along the outer shelf and slope of the eastern Bering Sea to Unimak Island, west in the Aleutian Islands to Stalemate Bank and Bowers Bank, and east from the Aleutian Islands to north of Graham Island, British Columbia. Depth range 75 to 1025 m, most frequently (36.8% of occurrences) on the mesobenthal slope between 200 and 300 m, and 96.2% of occurrences from depths of 100 to 650 m. This species is very similar to the darkfin sculpin, *Malacocottus zonurus*. Because of the available identification aids, many records of this species, particularly in the Bering Sea, may actually be records of the darkfin sculpin. Ignoring this possible source of error, the survey data extend the known range northward in the Bering Sea and westward in the Aleutian Islands, and provide a new maximum depth record.

Conclusions

Zoogeography	Kurile-Aleutian
Life zone	Outer shelf-bathybenthal (mesobenthal)
Range	From Hokkaido, Japan, and the Sea of Okhotsk north to Cape Navarin in the Bering Sea, west in the Aleutian Islands to Stalemate Bank, and southeast to Puget Sound, Washington
Depth	27 to 1025 m

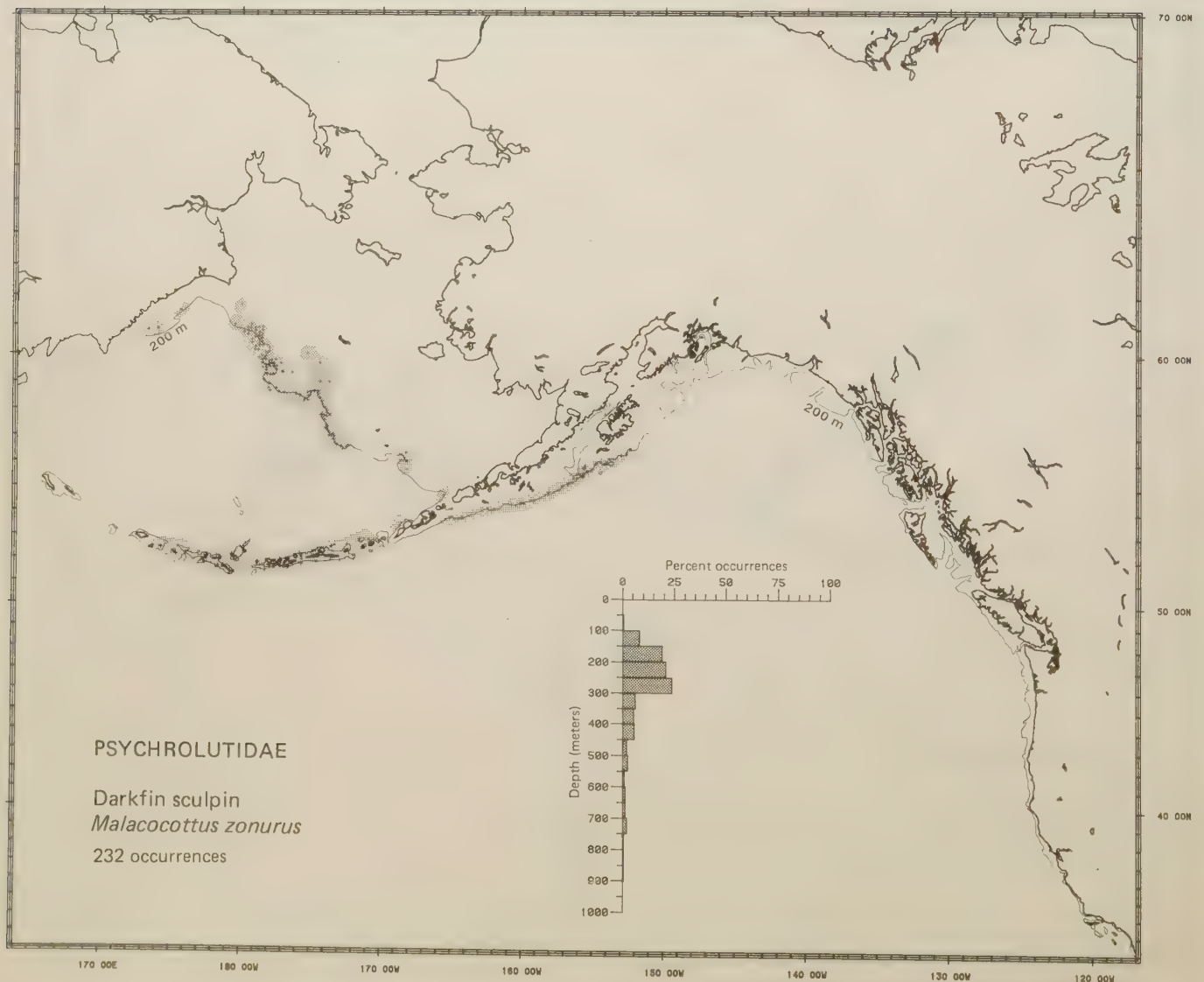


Literature Reported from the Sea of Okhotsk and the Bering Sea to Washington (Shmidt 1950; Howe 1981), at depths of 100 to 1980 m (Fedorov 1973a).

Survey data Found from off Glubokaya Bay (on the Korak Coast of the western Bering Sea) north to southeast of Cape Navarin, southeast along the outer shelf and slope of the eastern Bering Sea to Akutan Island, west in the Aleutian Islands to Agattu Island, and east to South Albatross Bank off Kodiak Island, Alaska. Depth range 75 to 875 m, most frequently (23.6% of occurrences) on the mesobenthal slope between 250 and 300 m, and 95.0% of occurrences from depths of 100 to 650 m. Survey data provide a more precise distribution of this species in the Bering Sea, extend its known range west in the Aleutian Islands, and provide a new minimum depth record. Because of its similarity to the blackfin sculpin, *Malacocottus kincaidi*, some records of the darkfin sculpin may be concealed in the distribution of the blackfin sculpin.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Outer shelf-bathybenthal (mesobenthal)
Range	From the Sea of Okhotsk to Cape Navarin in the western Bering Sea, southeast to Akutan Island, west in the Aleutian Islands to Agattu Island, and southeast to Washington
Depth	75 to 1980 m



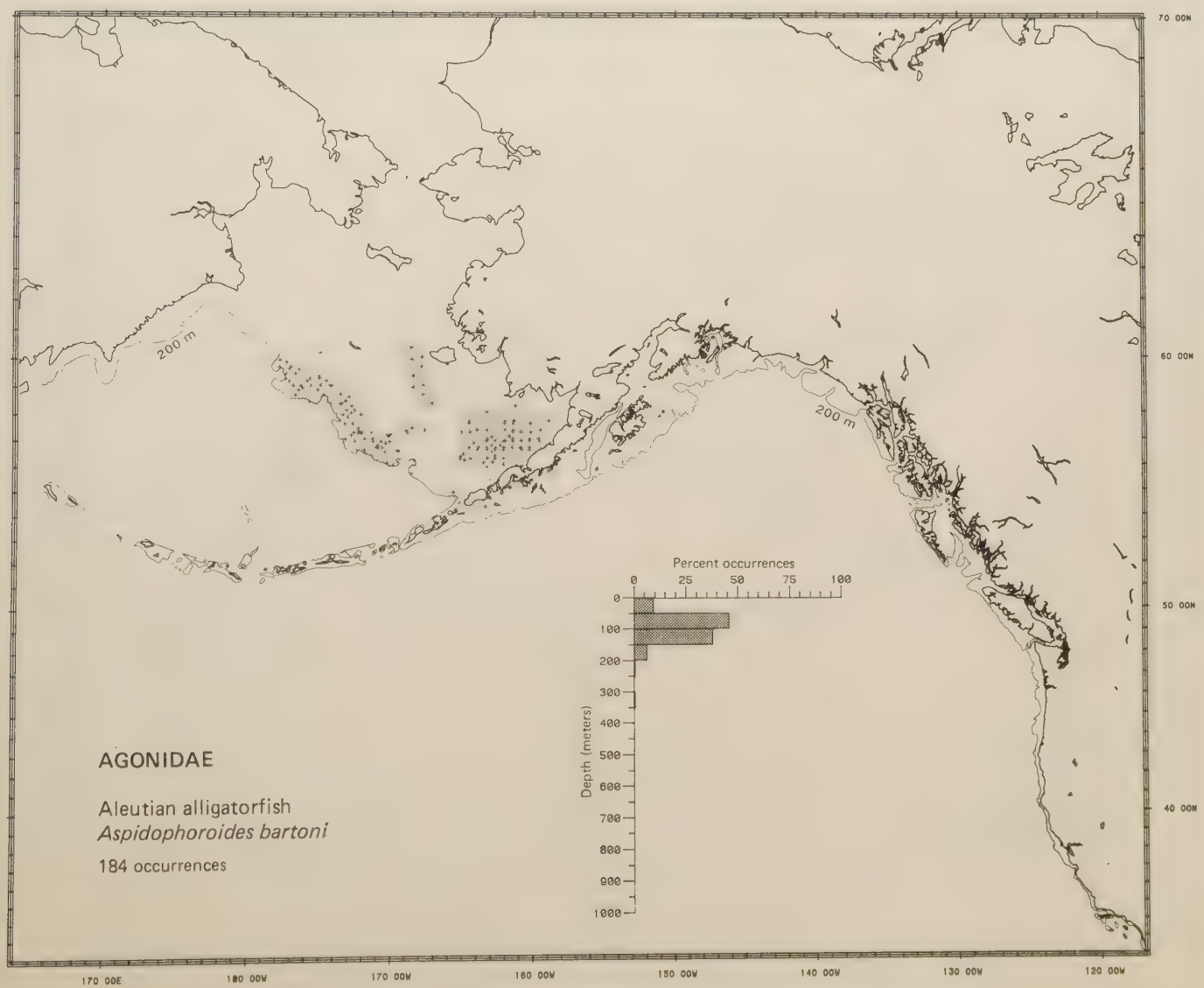
ALEUTIAN ALLIGATORFISH, *Aspidophoroides bartoni* Gilbert 1896

Literature Reported from the northern Sea of Japan and Sea of Okhotsk to the Arctic, south to the Gulf of Alaska, and west along the Aleutian Islands to Amchitka Island (Wilimovsky 1964; Quast and Hall 1972; Howe 1981), at depths of 22 to 223 m (Howe 1981).

Survey data Found from Pervenets Canyon and Nunivak Island in the eastern Bering Sea, southeast to the Alaska Peninsula and Unimak Pass, and east in the Gulf of Alaska to North Albatross Bank off Kodiak Island. Depth range 25 to 325 m, most frequently (45.7% of occurrences) on the middle shelf between 50 and 100 m, and 98.9% of occurrences from depths <200 m. Survey data provide a specific location for the species in the Gulf of Alaska and a new maximum depth record.

Conclusions

Zoogeography	Arctic-northern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From the northern Sea of Japan, Sea of Okhotsk, Amchitka Island in the Aleutian Islands, and North Albatross Bank, Kodiak Island, Alaska, north to the Arctic
Depth	22 to 325 m



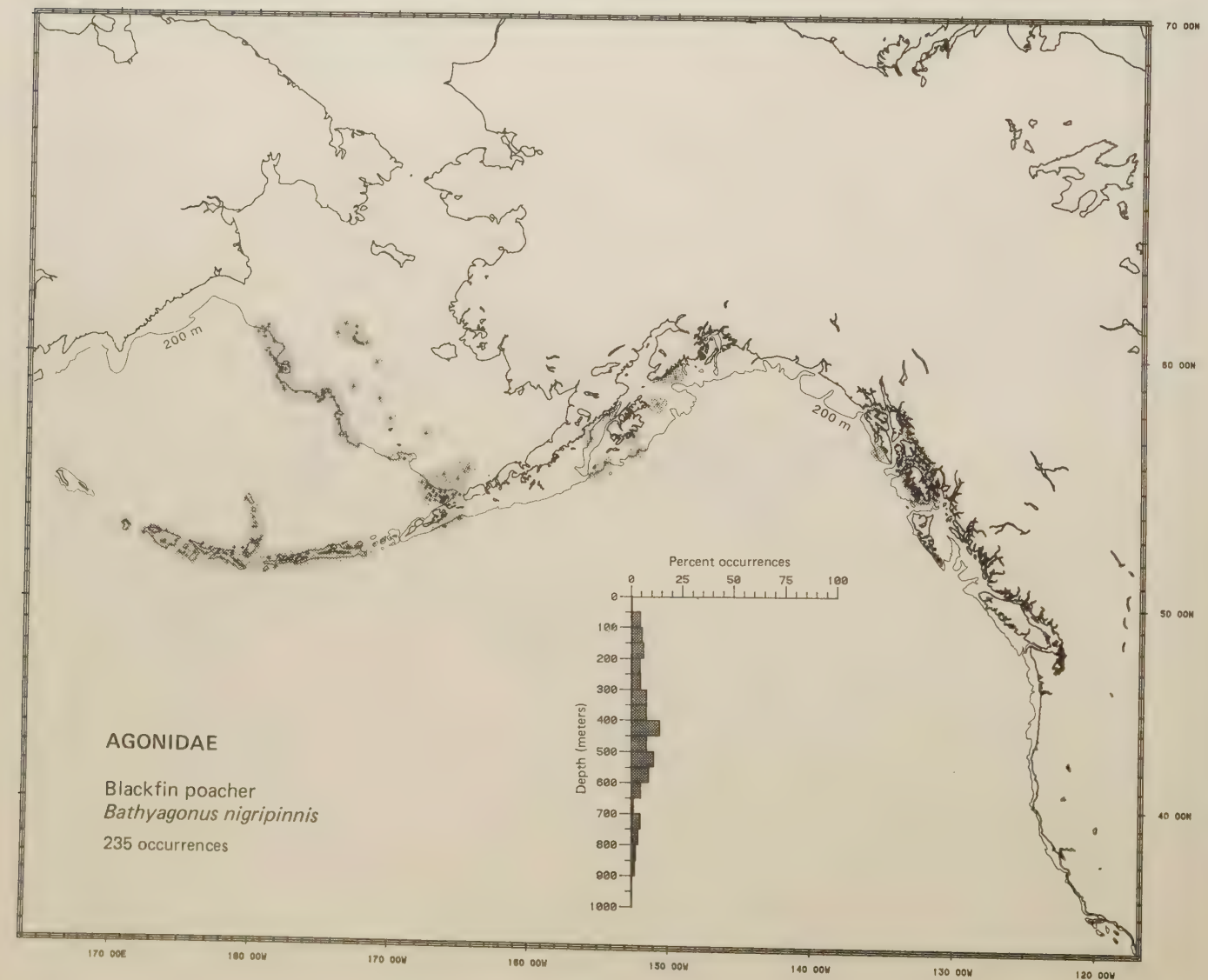
BLACKFIN POACHER, *Bathyagonus nigripinnis* Gilbert 1890

Literature Reported from Kamchatka and Bering Island to the Bering Sea and the Aleutians, and southeast to Eureka, California (Quast and Hall 1972; Hart 1973; Howe 1981; Eschmeyer and Herald 1983), at depths of 18 to 1248 m (Howe 1981).

Survey data Found from Navarin Canyon and north of Saint Matthew Island in the eastern Bering Sea southeast to Unimak Pass, west in the Aleutian Islands to Stalemate Bank and Bowers Bank, and east to Dixon Entrance in southeast Alaska. Depth range 25 to 975 m, most frequently (14.0% of occurrences) on the mesobenthal slope between 400 and 450 m, and 94.9% of occurrences from depths of 50 to 800 m. Survey data provide a more precise distribution in the Bering Sea and Aleutian Islands.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-bathybenthal (mesobenthal)
Range	From Kamchatka and Bering Island north to Saint Matthew Island in the Bering Sea, west in the Aleutian Islands to Stalemate Bank, and southeast to Eureka, California
Depth	18 to 1248 m



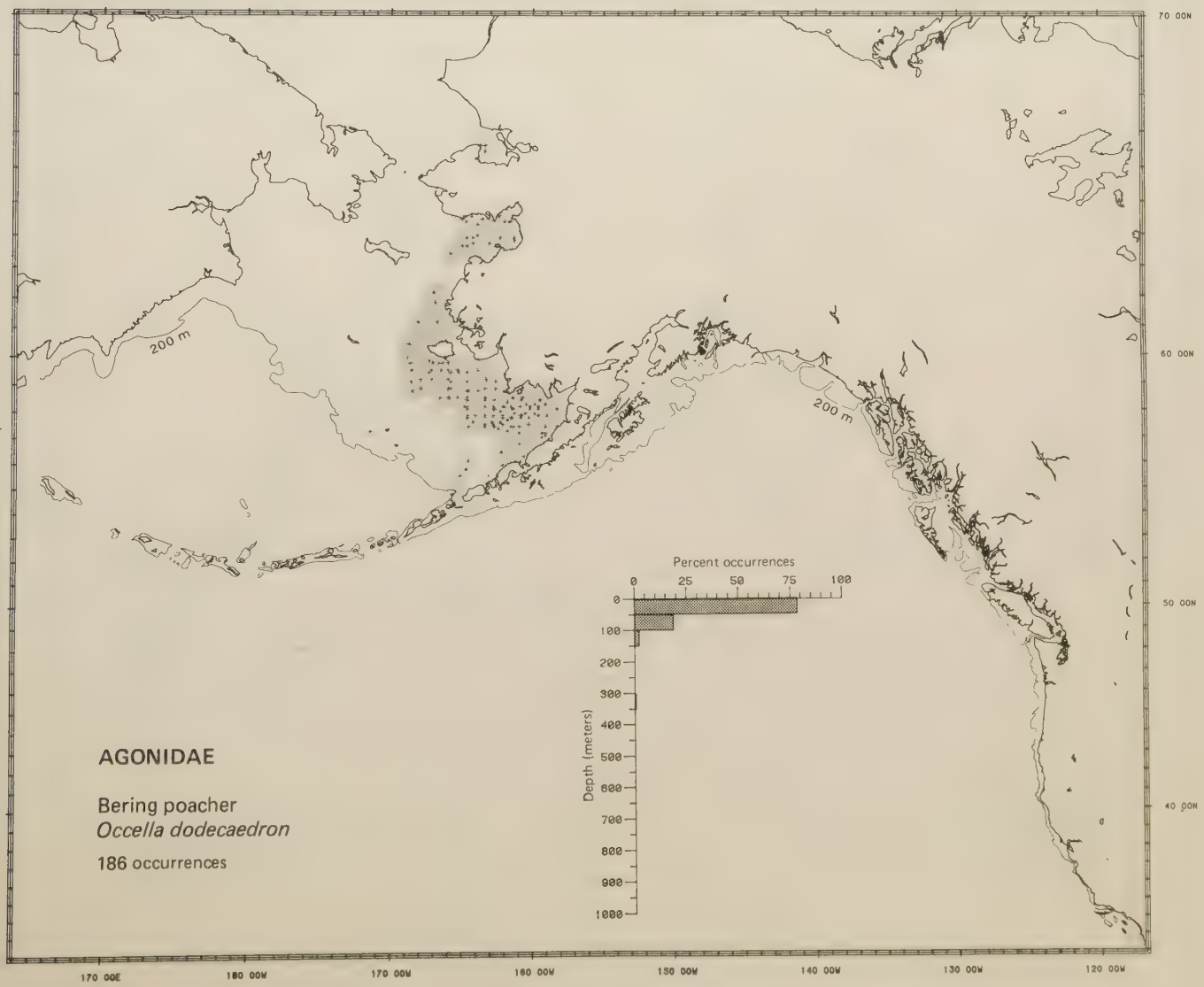
BERING POACHER, *Occella dodecaedron* (Tilesius 1813)

Literature Reported from the northern Sea of Japan and the Sea of Okhotsk to Olyutorski Bay and Norton Sound in the Bering Sea to Izembek Lagoon on the Alaska Peninsula (Andriyashev 1954; Wilimovsky 1964; Quast and Hall 1972), at depths of 7 to 59 m (Howe 1981).

Survey data Found from Kotzebue Sound in the Chukchi Sea south along the Alaskan coast of the eastern Bering Sea to north of Akun Island in the Aleutian Islands. Depth range 25 to 325 m, most frequently (78.5% of occurrences) on the inner shelf at depths <50 m, and 97.3% of occurrences from depths ≤100 m. Survey data provide a new northern limit, extend the known range to the west in the Aleutian Islands, and provide a new maximum depth record.

Conclusions

Zoogeography	Arctic-Okhotsk
Life zone	Inner shelf-middle shelf (inner shelf)
Range	From the northern Sea of Japan and Sea of Okhotsk and Akun Island in the Aleutian Islands, north to Kotzebue Sound in the Chukchi Sea
Depth	7 to 325 m

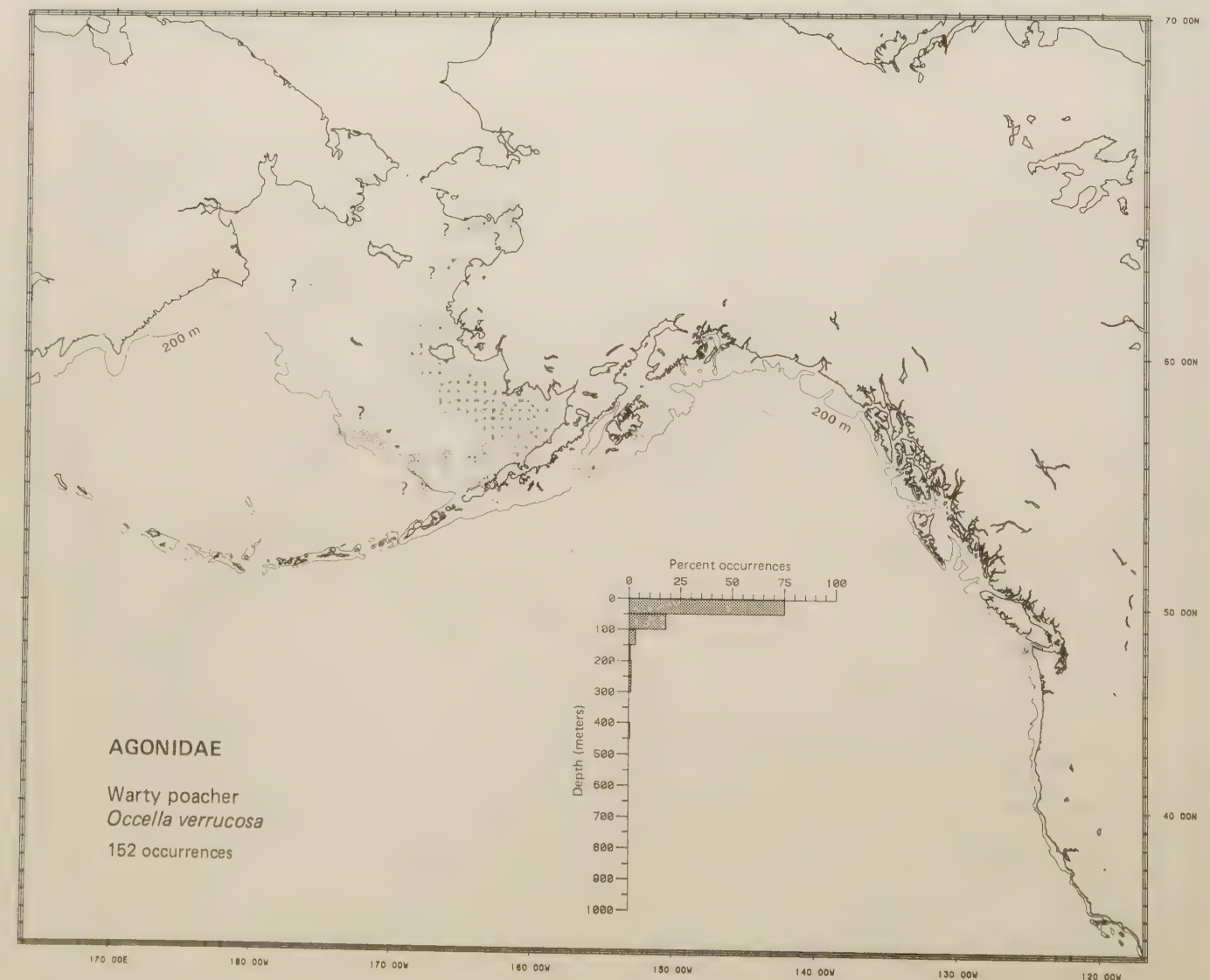


Literature Reported from Bristol Bay in the southeastern Bering Sea to Point Montara, California (Hart 1973; Eschmeyer and Herald 1983), at depths of 18 to 275 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from northern Norton Sound and the northwest eastern Bering Sea, southeast to the Alaska Peninsula and Unimak Island, and east to Kodiak Island, Alaska. Depth range 25 to 425 m, most frequently (75.0% of occurrences) on the inner shelf at depths <50 m, and 96.1% of occurrences from depths ≤150 m. Survey data extend the known distribution in the Bering Sea to the north and provide a new maximum depth record. Because of its similarity to the Bering poacher, *Occella dodecaedron*, and the identification aids used in the field, some of the records of this species in the Bering Sea may actually be records of Bering poacher.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-outer shelf (inner shelf)
Range	From Bristol Bay (possibly Norton Sound and the northwest eastern Bering Sea) to Unimak Island in the Aleutian Islands and southeast to Point Montara, California
Depth	18 to 425 m



STURGEON POACHER, *Podothecus acipenserinus* (Pallas 1813 *in* Tilesius) — Agonidae: Poachers

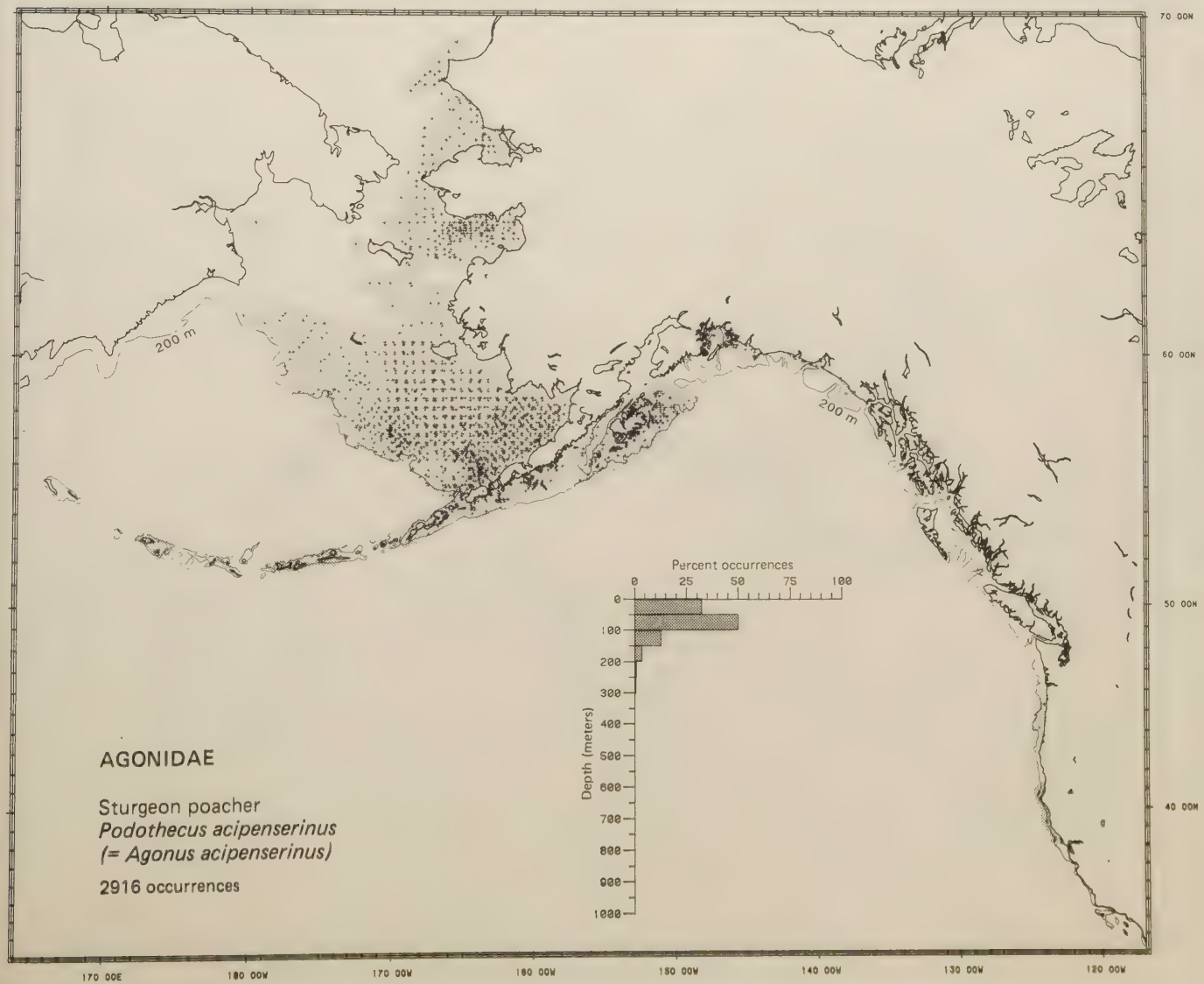
Taxonomic comment The sturgeon poacher is *Agonus acipenserinus* in Robins (1980), but Ilina (1978), the most recent taxonomic study of this and related species, placed it in the genus *Podothecus*.

Literature Reported from the Arctic near Point Barrow, Alaska, south to the Anadyr Gulf in the western Bering Sea, throughout the southeastern Bering Sea, west in the Commander-Aleutian Islands to the Commander Islands, and southeast to Eureka, California (Andriyashev 1939; Wilimovsky 1964; Quast and Hall 1972; Eschmeyer and Herald 1983), at depths of 2 to 240 m (Fedorov 1973a; Howe 1981).

Survey data Found from north of Cape Lisburne southwest in the eastern Bering Sea to off Cape Navarin and throughout the southeastern shelf to the Alaska Peninsula and Unimak Island, west in the Aleutian Islands to Attu Island and southeast to Point Reyes, California. Depth range 25 to 475 m, most frequently (49.9% of occurrences) on the middle shelf between 50 and 100 m, and 94.8% of occurrences from depths ⩽150 m. Survey data provide a new southern and maximum depth record.

Conclusions

Zoogeography	Arctic-eastern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Point Barrow, Alaska, in the Arctic south to the Anadyr Gulf, southeast in the Bering Sea, west along the Aleutian Islands to Attu Island, and southeast to Point Reyes, California
Depth	2 to 475 m



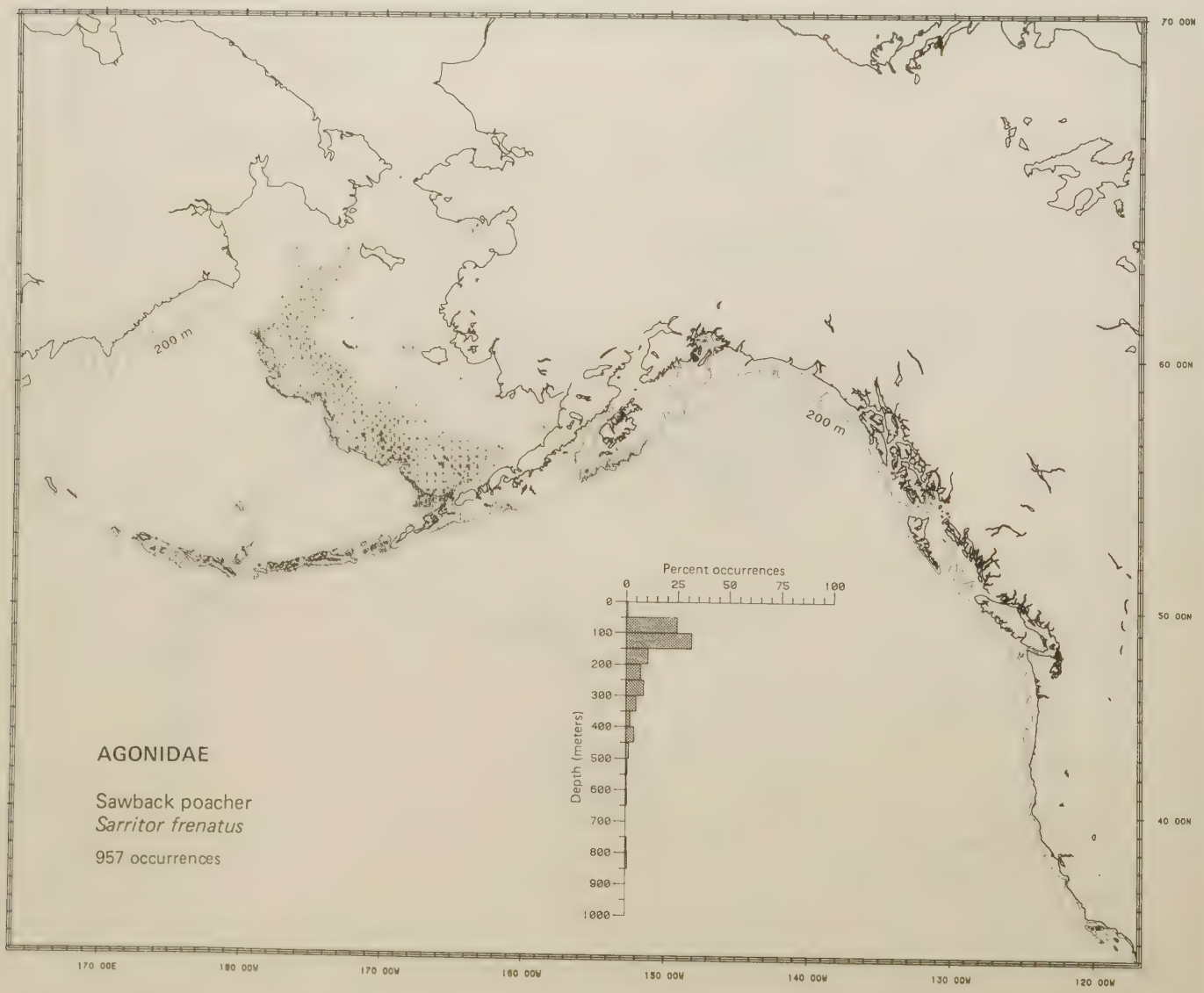
SAWBACK POACHER, *Sarritor frenatus* (Gilbert 1896)

Literature Reported from Japan north to the Gulf of Anadyr and Bristol Bay, west in the Aleutian Islands to Semisopochnoi Island, and east to Alice Arm, British Columbia (Andriyashev 1954; Wilimovsky 1964; Quast and Hall 1972; Hughes and Kashino 1984), at depths of 18 to 693 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from off Glubokaya Bay (on the Korak Coast of the eastern Bering Sea) to north of Norton Sound, southeast (primarily along the outer shelf and slope) to the Alaska Peninsula and Unimak Island, west in the Aleutian Islands to Stalemate Bank and Bowers Bank, and east in the Gulf of Alaska to North Albatross Bank off Kodiak Island. Depth range 25 to 975 m, most frequently (31.6% of occurrences) on the outer shelf between 100 and 150 m, and 95.0% of occurrences from depths of 50 to 550 m. Survey data provide a new northern record in the eastern Bering Sea, extend the known range west in the Aleutian Islands, and provide a new maximum depth record.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Middle shelf-bathybenthal (outer shelf)
Range	From Japan to the Gulf of Anadyr and Norton Sound in the Bering Sea, west in the Aleutian Islands to Stalemate Bank, and east to Alice Arm, British Columbia
Depth	18 to 975 m

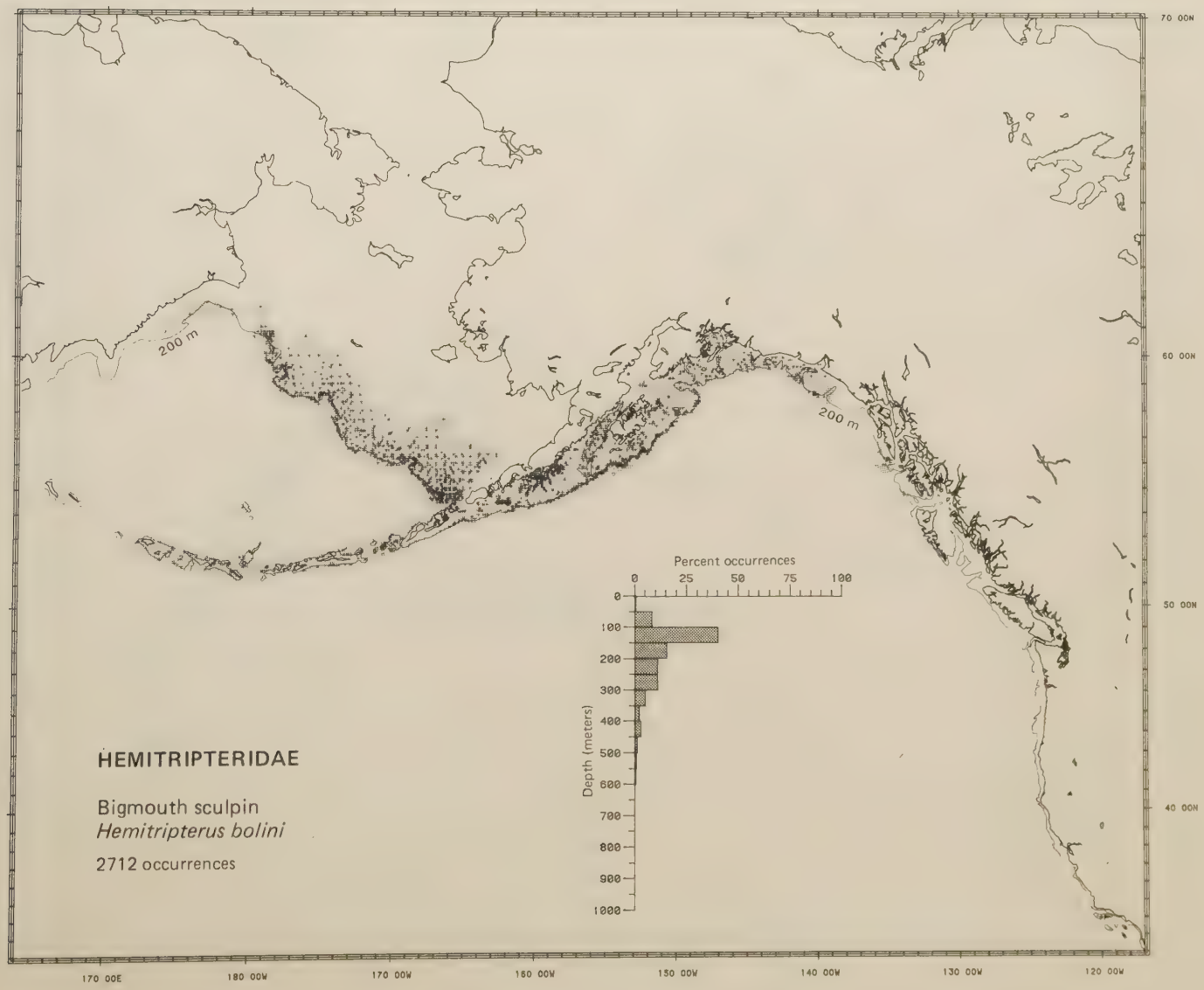


Literature Reported from Cape Navarin and Amchitka Island to Eureka, California (Quast and Hall 1972; Simenstad et al. 1977; Lea and Quirollo 1986), at depths of 60 to 800 m (Fedorov 1973a).

Survey data Found from off Anastasii Bay (on the Korak Coast in the western Bering Sea) north to off Cape Navarin, southeast to Bristol Bay, west in the Aleutian Islands to Attu Island and Bowers Bank, and east to Dall Island in southeast Alaska. Depth range 25 to 925 m, most frequently (40.2% of occurrences) on the outer shelf between 100 and 150 m, and 96.2% of occurrences from depths of 50 to 450 m. Survey data extend the known range slightly to the west in the eastern Bering Sea and in the Aleutian Islands, and expand the known depth range.

Conclusions

Zoogeography	Aleutian
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Anastasii Bay in the western Bering Sea, north to Cape Navarin, southeast in the Bering Sea to Unimak Island, west in the Aleutian Islands to Attu Island and Bowers Bank, and south to Eureka, California
Depth	25 to 925 m



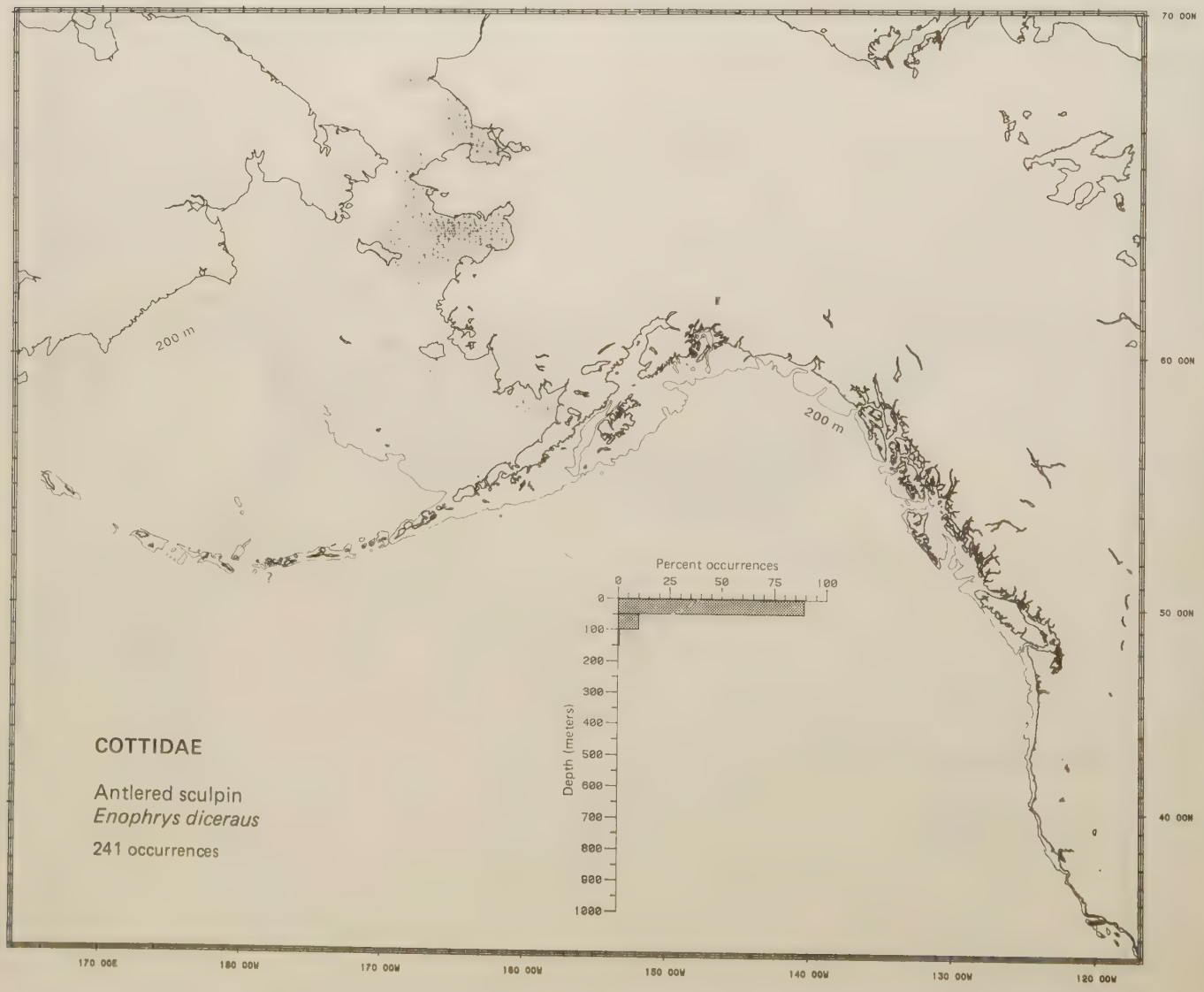
ANTLERED SCULPIN, *Enophrys diceraus* (Pallas 1787)

Literature Reported from the Sea of Japan and Sea of Okhotsk to the Arctic, west in the Aleutian Islands to Amchitka Island, and from there to southeast Alaska (Andriyashev 1954; Quast and Hall 1972; Simenstad et al. 1977; Howe 1981), at depths of "shallow waters" to 60 m (Howe 1981).

Survey data Found from west of Point Hope in the Chukchi Sea south along the Alaskan coast of the Bering Sea to off Egegik Bay on the north coast of the Alaska Peninsula and off Tanaga Island in the Aleutian Islands. Depth range 25 to 125 m, most frequently (89.2% of occurrences) on the inner shelf at depths <50 m, and 99.2% of occurrences from depths ≤100 m. Survey data provide a more specific northern limit in the Arctic and expand the known depth range.

Conclusions

Zoogeography	Arctic-northern boreal Pacific
Life zone	Inner shelf-middle shelf (inner shelf)
Range	From the Sea of Japan to Point Hope in the Chukchi Sea southeast to southeastern Alaska, and west to Amchitka Island in the Aleutian Islands
Depth	25 to 125 m



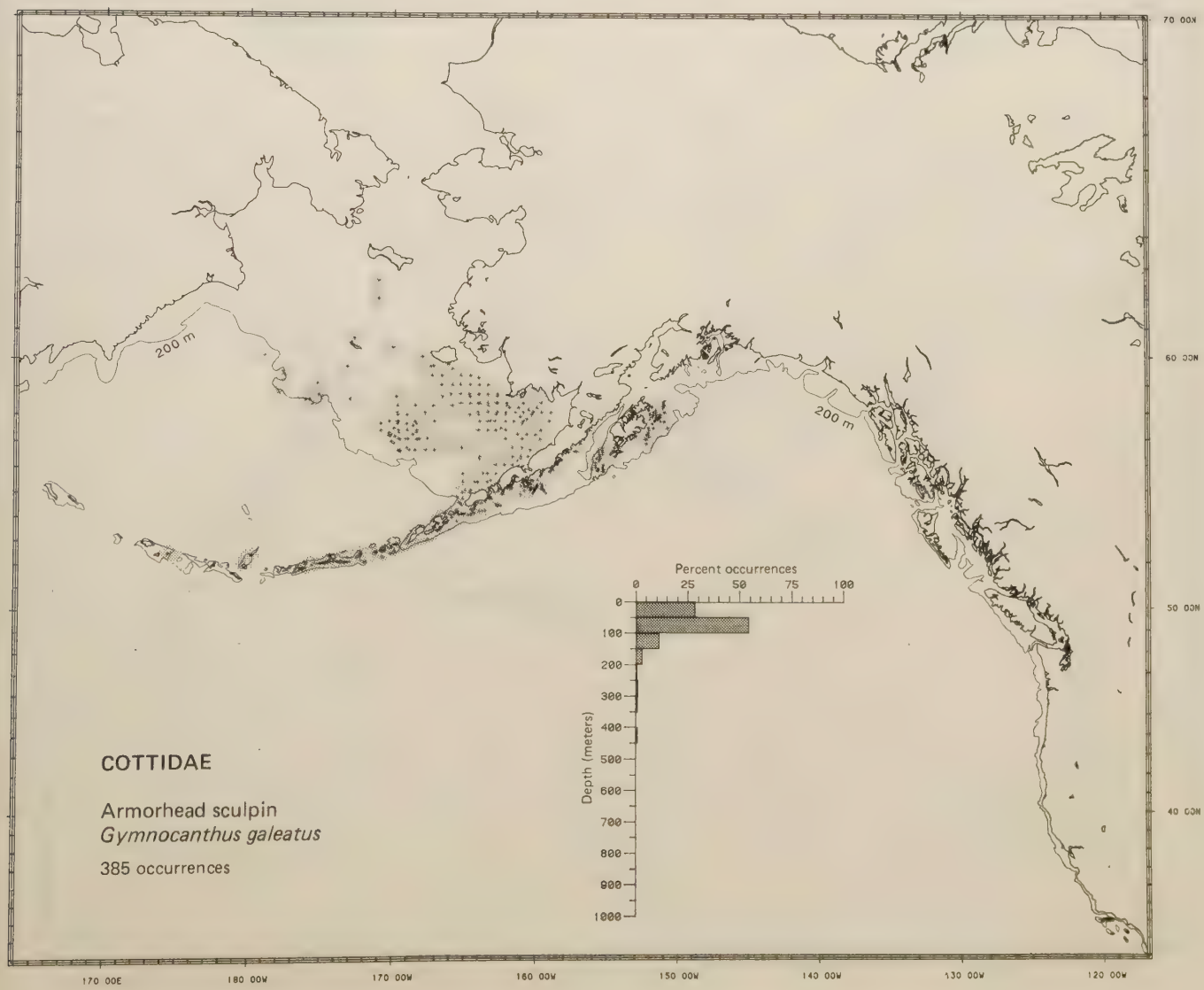
ARMORHEAD SCULPIN, *Gymnocanthus galeatus* Bean 1881

Literature Reported from Hokkaido, Japan, to the Bering Sea (but not in the Sea of Okhotsk) and from Amchitka Island in the Aleutian Islands east to Wales Island, British Columbia (Shmidt 1950; Quast and Hall 1972; Eschmeyer and Herald 1983), at depths of 0 to 167 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found in Pervenets Canyon on the northwest slope of the eastern Bering Sea, south of Saint Lawrence Island, southeast along the inner and middle shelf of the Bering Sea, and from Agattu Island in the Aleutian Islands east to Stevenson Entrance east of Afognak Island in the Gulf of Alaska. Depth range 25 to 625 m, most frequently (54.3% of occurrences) on the middle shelf between 50 and 100 m, and 93.5% of occurrences from depths ⩽150 m. Survey data provide a more precise northern limit in the Bering Sea, extend the known range to the west in the Aleutian Islands, and extend the maximum known depth of occurrence. However, deep records for this species are anomalous and must be regarded as questionable.

Conclusions

Zoogeography	Kurile-Aleutian
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Hokkaido, Japan, to south of Saint Lawrence Island in the Bering Sea (but not in the Sea of Okhotsk), west to Agattu Island in the Aleutian Islands, and east to Wales Island, British Columbia
Depth	0 to 167 m (possibly to 625 m)

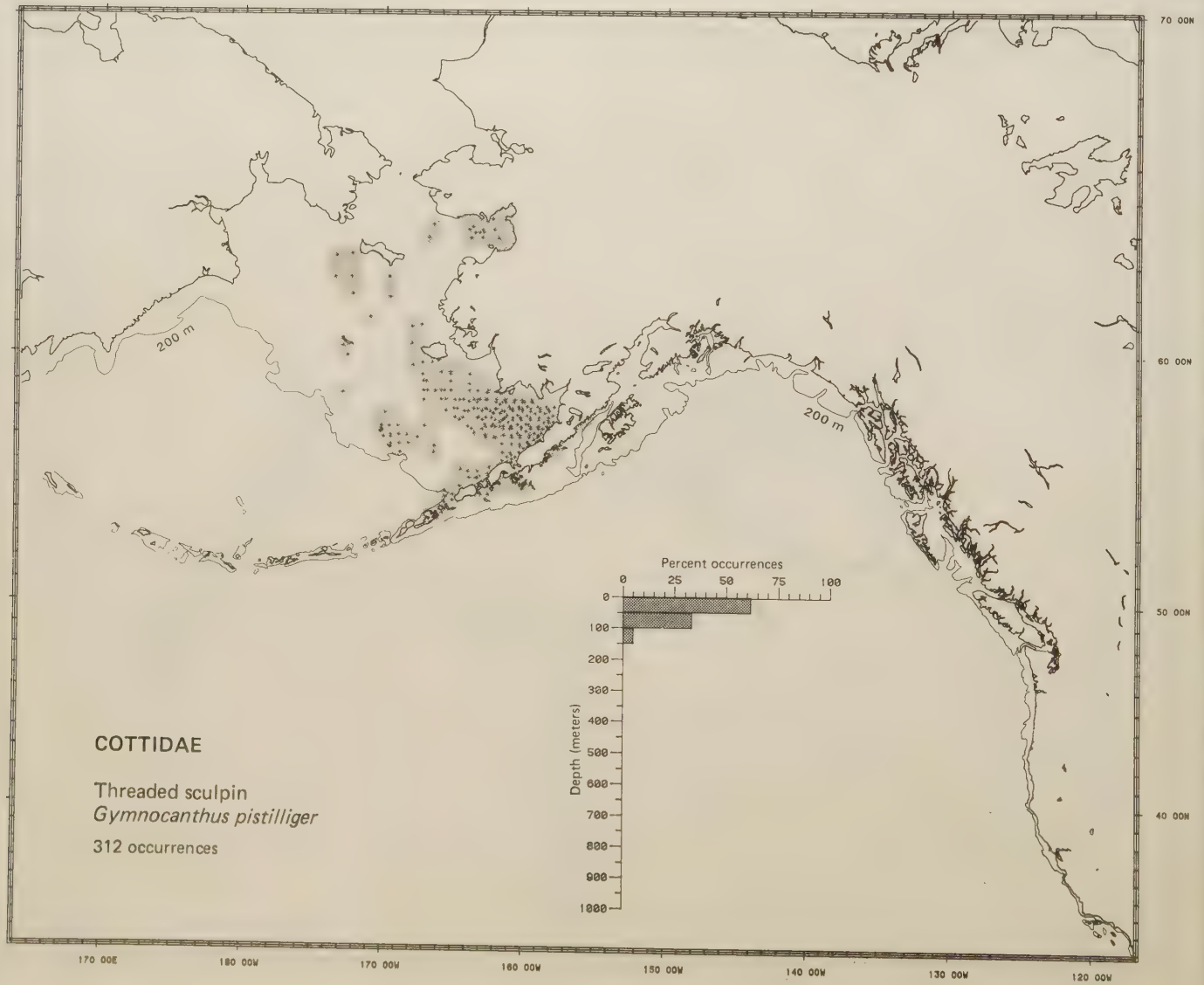


Literature Reported from the Sea of Japan and the Sea of Okhotsk to the Chukchi Peninsula in the Bering Sea, along the Aleutian Islands to Kiska Island, and east to southeastern Alaska (Andriyashev 1954; Wilimovsky 1964; Eschmeyer and Herald 1983), at depths of 0 to 100 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found west of Saint Lawrence Island, from Norton Sound south in the eastern Bering Sea to Unalaska Island in the Aleutian Islands, and from there east along the Alaska Peninsula to Puale Bay. Depth range 25 to 325 m, most frequently (61.5% of occurrences) on the inner shelf at depths <50 m, and 94.6% of occurrences from depths <100 m. Survey data provide a new maximum depth record but do not significantly alter the known geographic range.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Inner shelf-middle shelf (inner shelf) species
Range	From the Sea of Japan and the Sea of Okhotsk to the Chukchi Peninsula and Norton Sound in the Bering Sea, west in the Aleutian Islands to Kiska Island, and east to southeastern Alaska
Depth	0 to 325 m

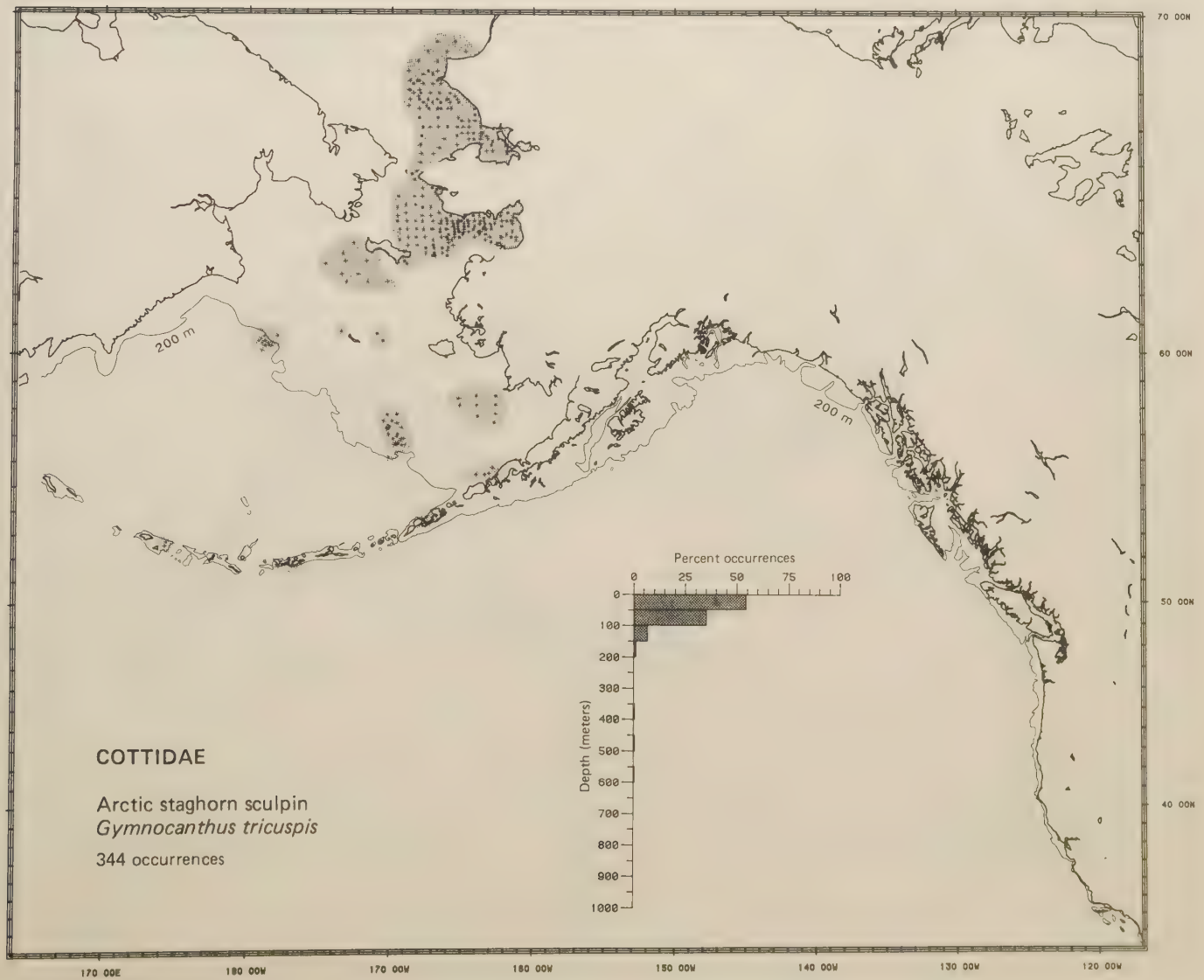


Literature Reported from Natalii Bay (on the Korak Coast of the western Bering Sea) north to the Arctic where it is circumpolar, its range extending into the Atlantic as far as Eastport, Maine, western Greenland, and Norway, from depths of 0 to 240 m (Andriyashev 1954).

Survey data Found from northeast of Cape Lisburne in the Chukchi Sea to north of Unimak Island in the Bering Sea and along the Aleutian Islands to Agattu Island. Depth range 25 to 825 m, most frequently (54.4% of occurrences) on the inner shelf at depths <50 m, and 95.9% of occurrences from depths <150 m. Survey data extend the known southern limit in the North Pacific to Agattu Island in the Aleutian Islands and provide a new maximum depth record. However, depth records greater than 200 m appear to be anomalous and must be regarded as questionable.

Conclusions

Zoogeography	Arctic-circumboreal Atlantic
Life zone	Inner shelf-outer shelf (inner shelf)
Range	From Natalii Bay in the western Bering Sea and Agattu Island in the Aleutian Islands north throughout the Arctic and south in the Atlantic to Eastport, Maine, western Greenland, and Norway
Depth	0 to 240 m (possibly to 825 m)

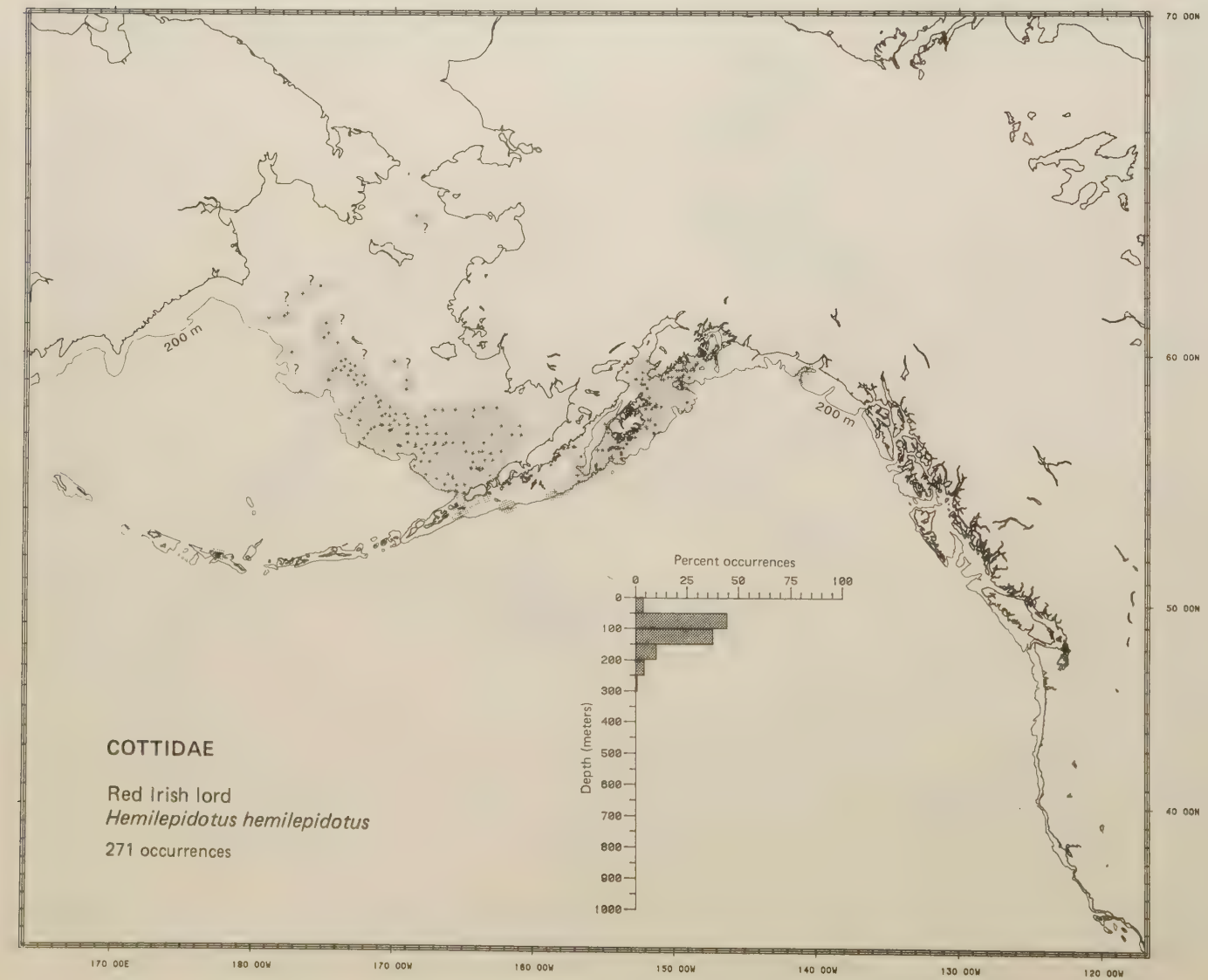


Literature Reported from Cape Piratkova to the Gulf of Ozernoy in southeastern Kamchatka, along the Commander and Aleutian Islands, north in the southeastern Bering Sea to Saint Paul Island, and southeast to Mussel Point, California (Hart 1973; Peden 1978), at depths from the intertidal zone to 80 m (Peden 1978; Howe 1981).

Survey data Found from off Port Clarence in the northern Bering Sea and Cape Navarin in the northwestern shelf of the eastern Bering Sea southeast to Bristol Bay and from there west along the Aleutian Islands to Kiska Island and east in the Gulf of Alaska to off Yakutat Bay. Depth range 25 to 275 m, most frequently (44.3% of occurrences) on the middle shelf between 50 and 100 m, and 95.6% of occurrences from depths of 50 to 250 m. Survey data extend the known range north and northwest in the Bering Sea and provide a new maximum depth record. However, in the northern and northwestern portion of the eastern Bering Sea, records of this species may actually be records of female butterfly sculpin, *Hemilepidotus papilio* (D. W. Kessler, Kodiak Lab., Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Kodiak, AK 99615, pers. commun. August 1983). Hence the northwest extension of the range of this species in the Bering Sea must be regarded as questionable.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (middle shelf)
Range	From Cape Piratkova to the Gulf of Ozernoy in southeastern Kamchatka, along the Commander and Aleutian Islands, north in the Bering Sea to Saint Paul Island, and southeast to Mussel Point, California
Depth	Intertidal zone to 275 m



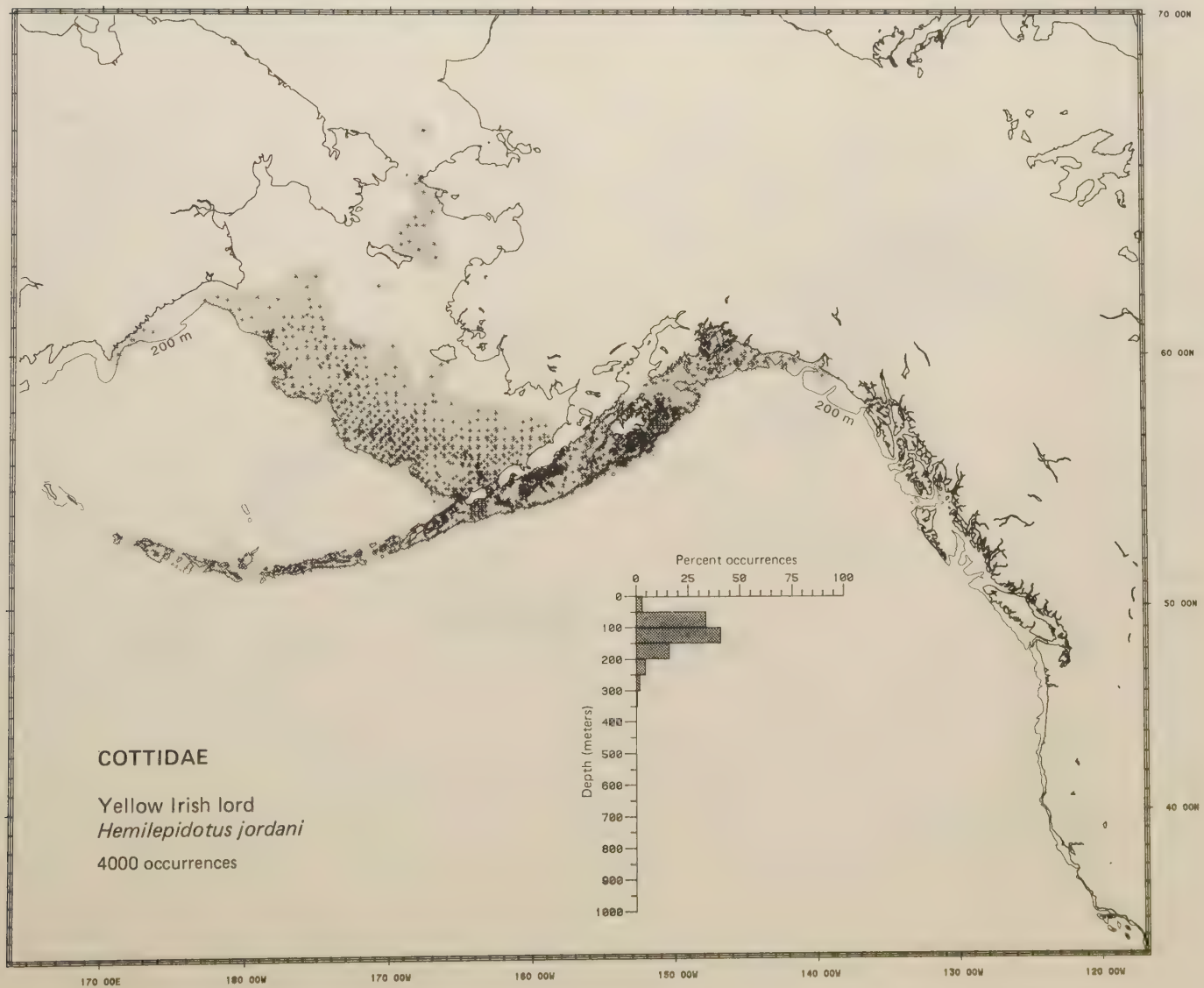
YELLOW IRISH LORD, *Hemilepidotus jordani* Bean 1881

Literature Reported from the northern Kurile Islands and southwestern Kamchatka north to the Anadyr Gulf, southeast in the eastern Bering Sea to the Alaska Peninsula, west throughout the Aleutian and Commander Islands, and east to Sitka, Alaska (Peden 1978), at depths "subtidal" to 220 m (Peden 1978; Howe 1981).

Survey data Found from Cape Olyutorski in the western Bering Sea north to the southern Chukchi Sea, southeast to Bristol Bay, and from there west to Stalemate Bank in the Aleutian Islands and east to Icy Strait in southeast Alaska. Depth range 25 to 525 m, most frequently (40.6% of occurrences) on the outer shelf between 100 and 150 m, and 97.6% of occurrences from depths ≤250 m. Survey data provide a new known northern limit and more precisely define and expand the known depth distribution.

Conclusions

Zoogeography	Kurile-Aleutian
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From the northern Kurile Islands and southwest Kamchatka north to the Anadyr Gulf and east to Sitka, Alaska (including the Commander and Aleutian Islands)
Depth	25 to 525 m



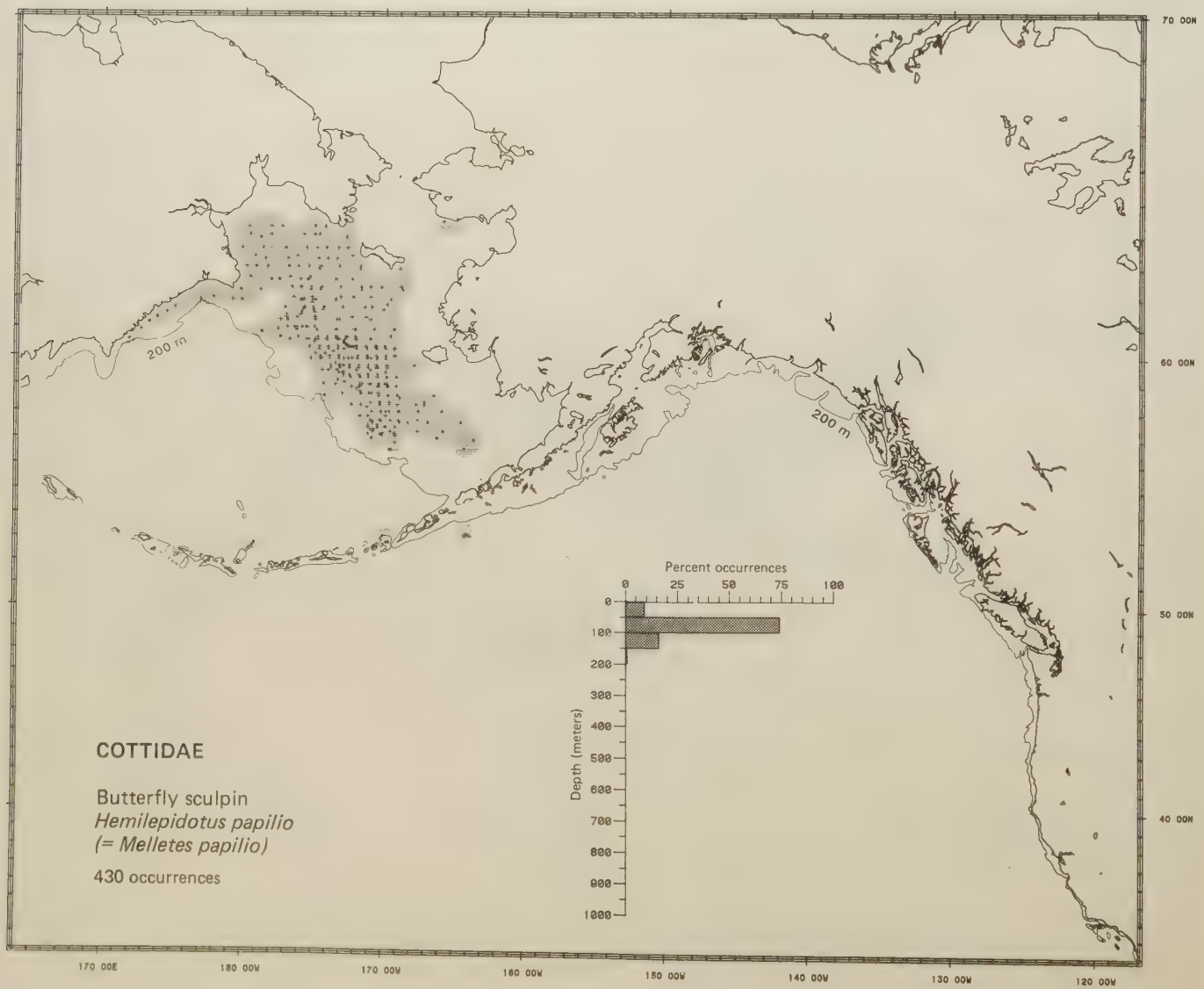
Taxonomic comment The butterfly sculpin is *Melletes papilio* in Robins (1980) but Peden (1978), the most recent revision of hemilepidotine cottids, placed this species in the genus *Hemilepidotus*.

Literature Reported from Hokkaido, Japan, and the Sea of Okhotsk to the Chukchi Sea and southeast in the Bering Sea to east of the Pribilof Islands (Andriyashev 1954; Peden 1978; Howe 1981), at depths of 20 to 240 m (Fedorov 1973a).

Survey data Found from northeast of Cape Olyutorski in the western Bering Sea north to Cape Chukotskiy, Siberia, and Nome, Alaska, southeast to Bristol Bay and west in the Aleutian Islands to Buldir Island. Depth range 25 to 275 m, most frequently (74.2% of occurrences) on the middle shelf between 50 and 100 m, and 99.1% of occurrences from depths ≤150 m. Survey data extend the known range into the Aleutian Islands and provide a new maximum depth record.

Conclusions

Zoogeography	Arctic-Okhotsk
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Hokkaido, Japan, and the Sea of Okhotsk, north to the Chukchi Sea, southeast in the Bering Sea, and southwest to Buldir Island in the Aleutian Islands
Depth	20 to 275 m



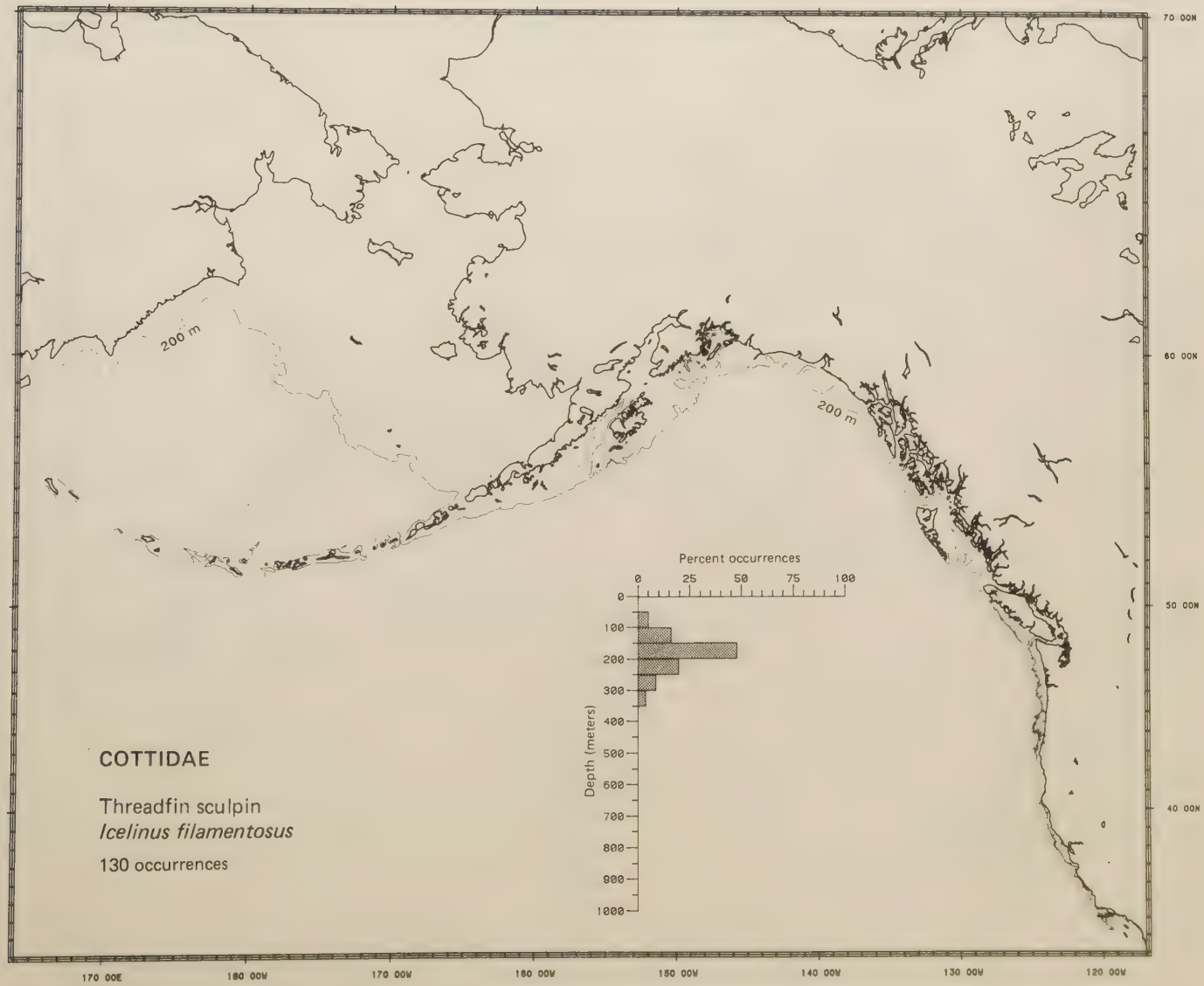
THREADFIN SCULPIN, *Icelinus filamentosus* Gilbert 1890

Literature Reported from northern British Columbia to Point Loma and Cortez Bank in southern California (Hart 1973; Eschmeyer and Herald 1983), at depths of 18 to 800 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from east of Chirikof Island (south of Kodiak Island) to the Santa Barbara Channel, California. Depth range 25 to 225 m, most frequently (47.6% of occurrences) on the outer shelf between 150 and 200 m, and 96.4% of occurrences from depths of 50 to 300 m. Survey data extend the known range to the northwest Gulf of Alaska.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Chirikof Island in the western Gulf of Alaska to Point Loma and Cortez Bank in southern California
Depth	18 to 800 m



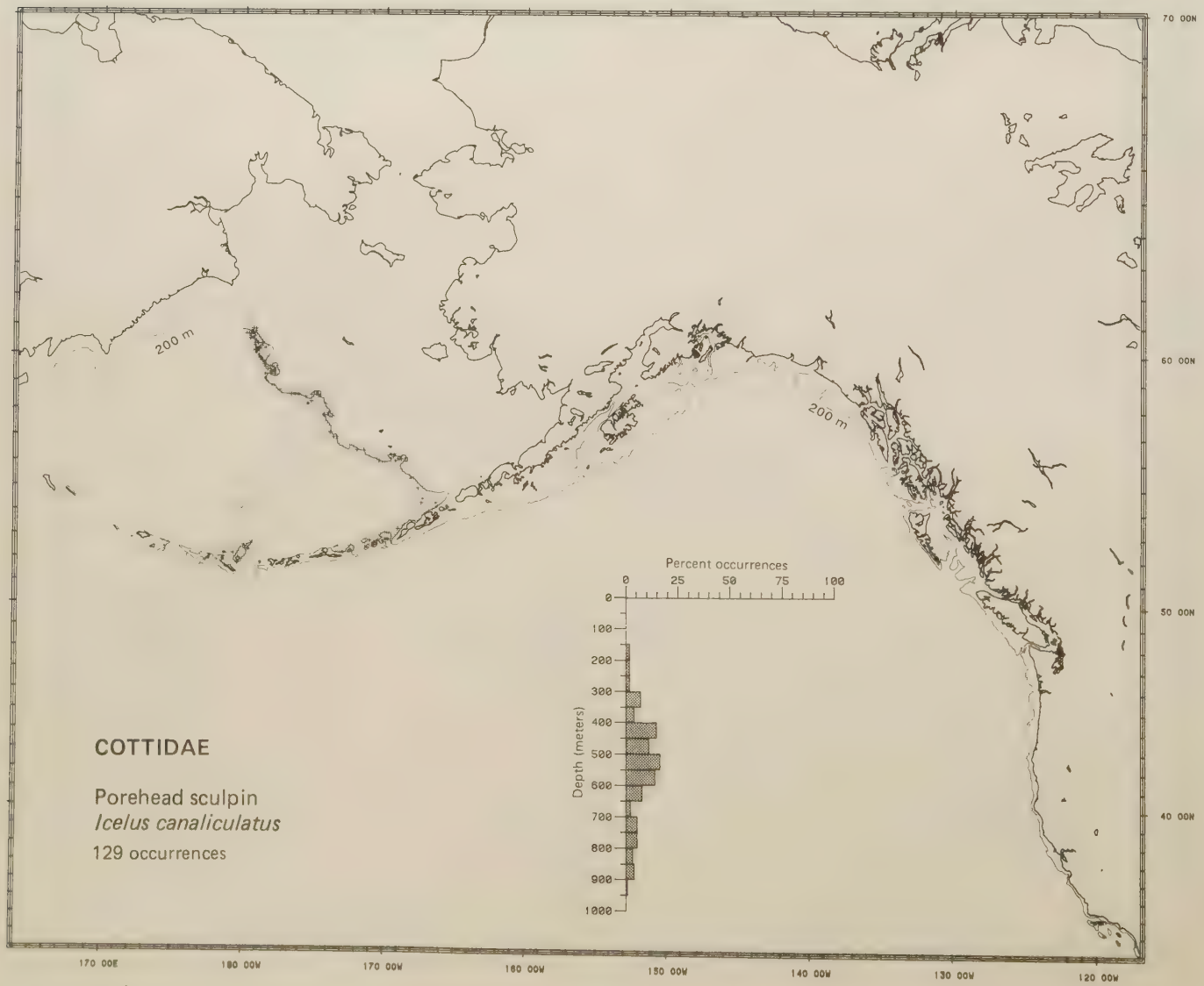
POREHEAD SCULPIN, *Icelus canaliculatus* Gilbert 1896

Literature Reported from Hokkaido, Japan, to the eastern Bering Sea, west to Unalaska Island in the Aleutian Islands, and east to the Gulf of Alaska (Quast and Hall 1972; Howe 1981; Yabe et al. 1983), at depths of 20 to 800 m (Nelson, D. W. 1984).

Survey data Found from Navarin Canyon on the northwest slope of the eastern Bering Sea, southeast to Akutan Island in the Aleutian Islands and west to Agattu Island. Depth range 175 to 925 m, most frequently (16.3% of occurrences) on the bathybenthal slope between 500 and 550 m, and 96.1% of occurrences from depths of 250 to 900 m. Survey data provide a more precise northern limit in the Bering Sea, extend the known range westward in the Aleutian Islands, and provide a new maximum depth record.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Mesobenthal-bathybenthal (bathybenthal)
Range	From Hokkaido, Japan, to Navarin Canyon in the Bering Sea, southeast along the slope of the eastern Bering Sea to the Aleutian Islands, west in the Aleutian Islands to Agattu Island, and east to the Gulf of Alaska
Depth	26 to 925 m



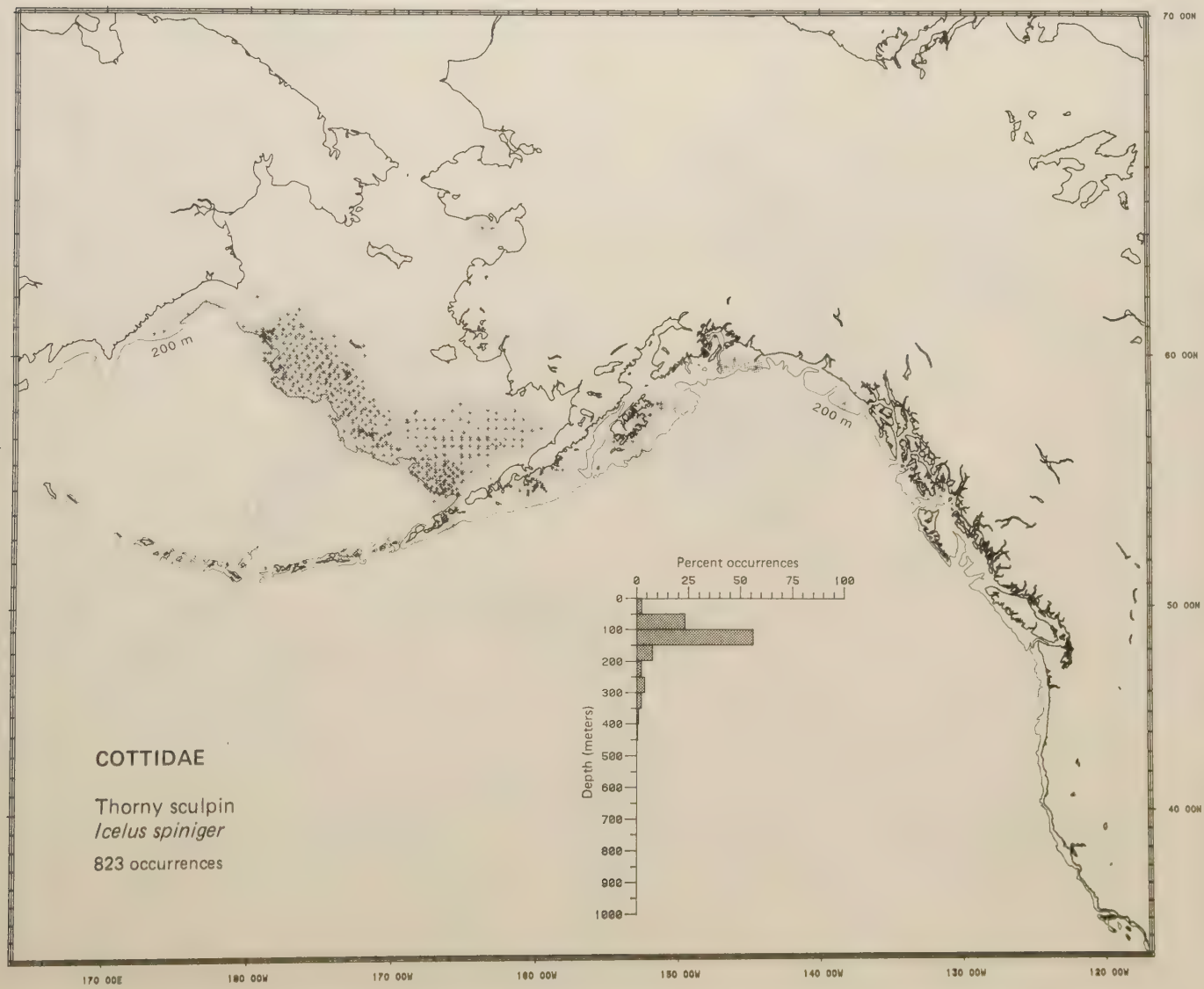
THORNY SCULPIN, *Icelus spiniger* Gilbert 1896

Literature Reported from the eastern Sea of Okhotsk to Cape Navarin in the Bering Sea, along the Commander and Aleutian Islands, and southeast to Vancouver Island, British Columbia (Okada and Kobayashi 1968; Nelson, D. W. 1984), from 31 to 770 m depths (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from off Glubokaya Bay (on the Korak Coast of the western Bering Sea) north to Norton Sound, southeast to off Hagemeister Strait in Bristol Bay, west along the Aleutian Islands to Agattu Island, and east to off Lituya Bay in southeastern Alaska. Depth range 25 to 675 m, most frequently (56.1% of occurrences) on the outer shelf between 100 and 150 m, and 95.7% of occurrences from depths <300 m. Survey data provide a more precise distribution in the Bering Sea, extend the known range westward in the Aleutian Islands, and provide a shallower depth record. The presence of this species in Norton Sound appears to be anomalous; records from that region may be of other *Icelus* species.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From the eastern Sea of Okhotsk to Cape Navarin (possibly Norton Sound) in the Bering Sea, west in the Aleutian Islands to Agattu Island, and southeast to Vancouver Island, British Columbia
Depth	25 to 770 m



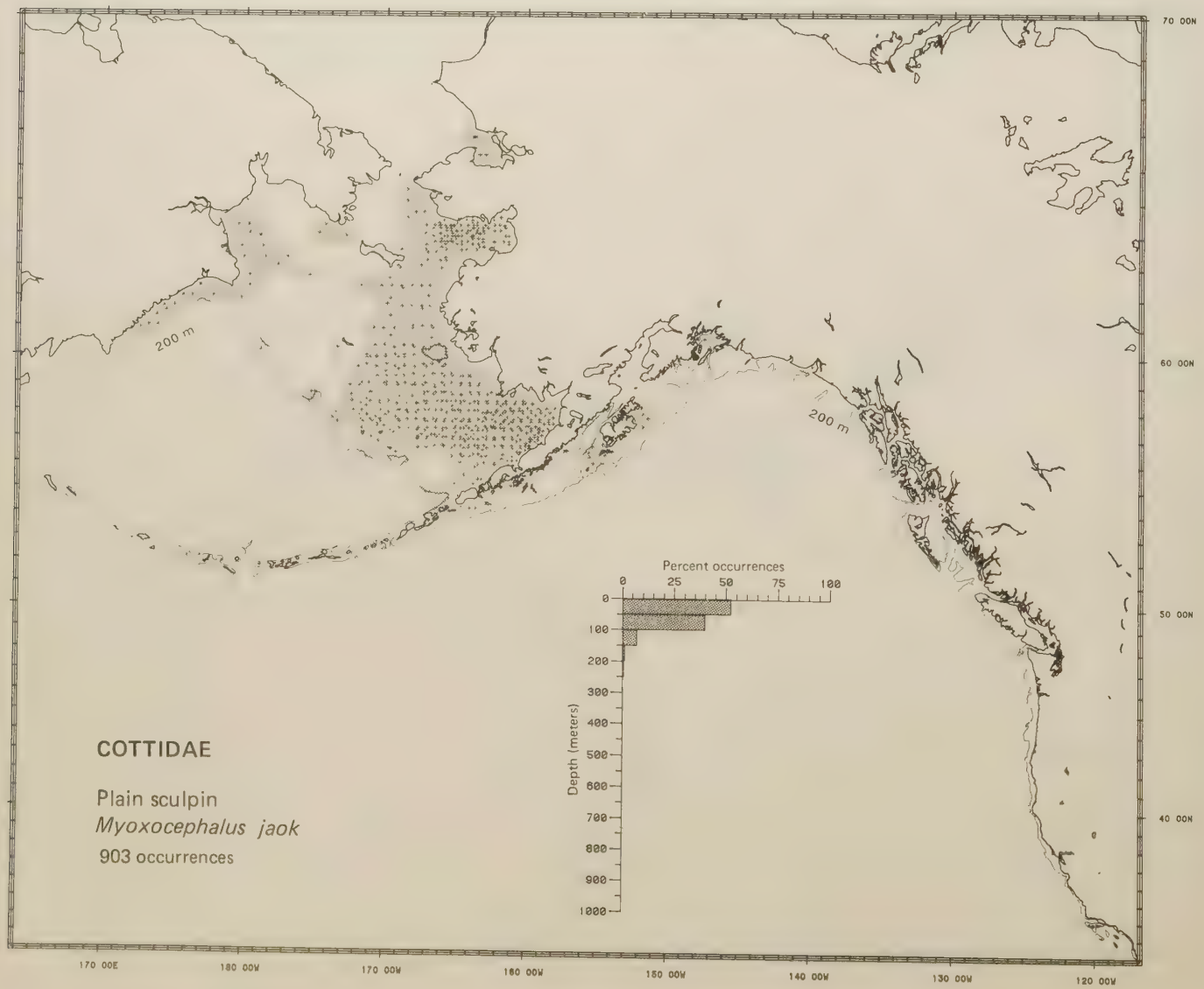
PLAIN SCULPIN, *Myoxocephalus jaok* (Cuvier and Valenciennes 1829) — Cottidae: Sculpins

Literature Reported from northern North Korea in the Sea of Japan and Sea of Okhotsk to the Chukchi Sea, in the Commander Islands, southeast in the Bering Sea, west in the Aleutian Islands to Unalaska Island, and east to southeast Alaska (Andriyashev 1954; Wilimovsky 1964; Okada and Kobayashi 1968; Howe 1981; Eschmeyer and Herald 1983), at depths of 2 to 550 m (Neelov 1979).

Survey data Found from off Glubokaya Bay (on the Korak Coast in the western Bering Sea) north to Kotzebue Sound in the Chukchi Sea, southeast in the eastern Bering Sea to Unalaska Island, and east to Kodiak Island. Depth range 25 to 475 m, most frequently (52.0% of occurrences) on the inner shelf at depths <50 m, and 98.3% of occurrences from depths <150 m. Survey data provide a more precise distribution in the Chukchi and eastern Bering Seas and a better description of depth preference, but do not otherwise expand the known range of the species.

Conclusions

Zoogeography	Arctic-northern boreal Pacific
Life zone	Inner shelf-outer shelf (inner shelf)
Range	From the Sea of Japan and Sea of Okhotsk and from southeast Alaska and Unalaska Island north to the Chukchi Sea
Depth	2 to 550 m



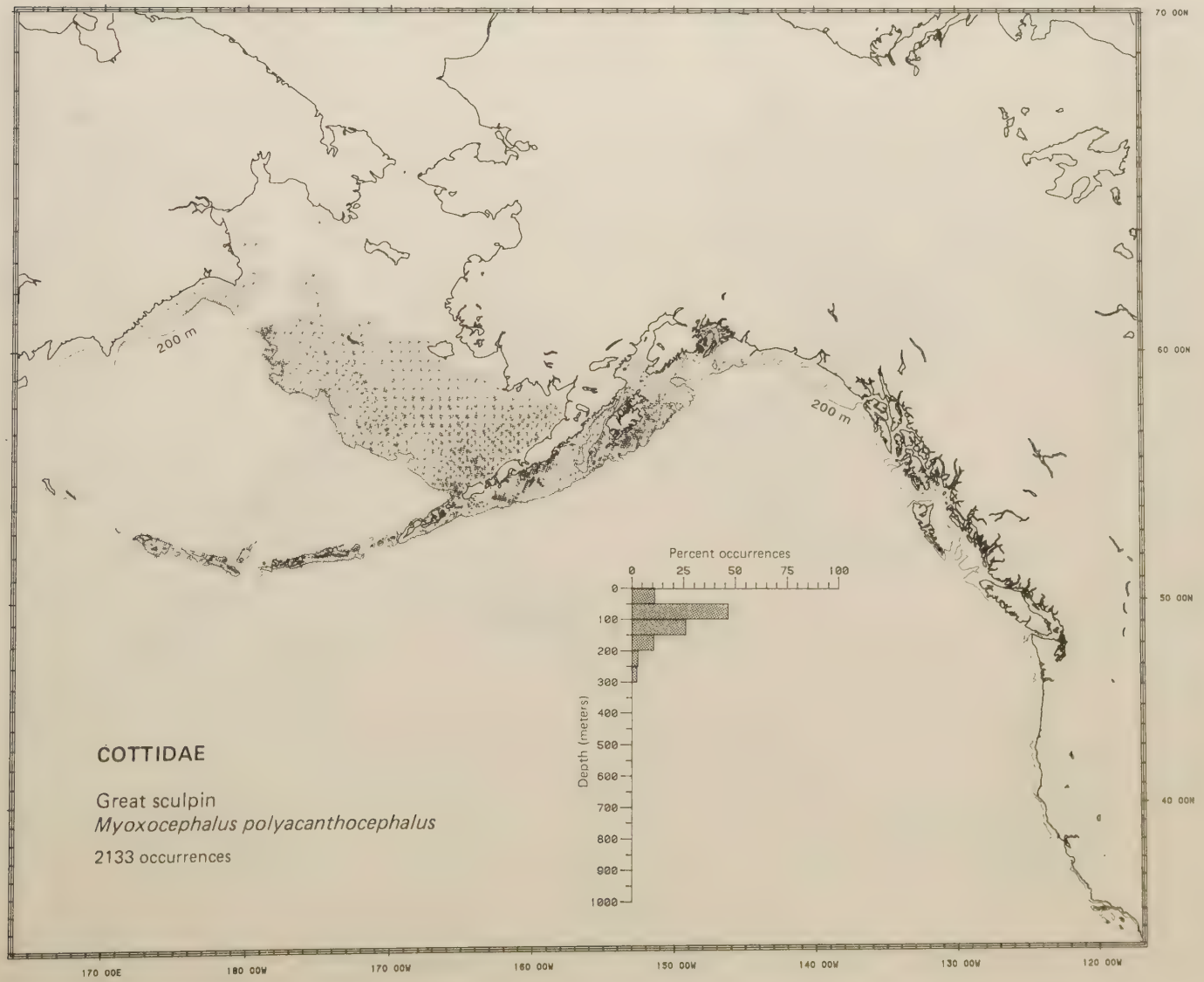
GREAT SCULPIN, *Myoxocephalus polyacanthocephalus* (Pallas [1814])

Literature Reported from the eastern Sea of Japan to the Commander Islands (but not in the Sea of Okhotsk), east along the Aleutians, north in the Bering Sea to the Pribilof Islands, and southeast to Puget Sound, Washington (Wilimovsky 1964; Quast and Hall 1972; Eschmeyer and Herald 1983), at depths of 0 to 320 m (Neelov 1979).

Survey data Found from Cape Olyutorski in the western Bering Sea north to off Cape Shpanberga in the Anadyr Gulf, southeast in the eastern Bering Sea to the Alaska Peninsula, west in the Aleutian Islands to Attu Island, and east to Cape Saint Elias in the northern Gulf of Alaska. Depth range 25 to 775 m, most frequently (46.5% of occurrences) on the middle shelf between 50 and 100 m, and 96.8% of occurrences from depths <250 m. Survey data extend the known range to the north in the Bering Sea and provide a new maximum depth record. It is possible that some Bering Sea records of this species may actually be records of either the warty sculpin, *Myoxocephalus verrucosus*, or the plain sculpin, *Myoxocephalus jaok*.

Conclusions

Zoogeography	Kurile-Aleutian
Life zone	Inner shelf-mesobenthal (middle shelf)
Range	From the eastern Sea of Japan to Cape Shpanberga in the Anadyr Gulf (but not in the Sea of Okhotsk), Bering Sea, west throughout the Aleutians, and southeast to Puget Sound, Washington
Depth	0 to 775 m



WARTY SCULPIN, *Myoxocephalus verrucosus* (Bean 1881)

Cottidae: Sculpins

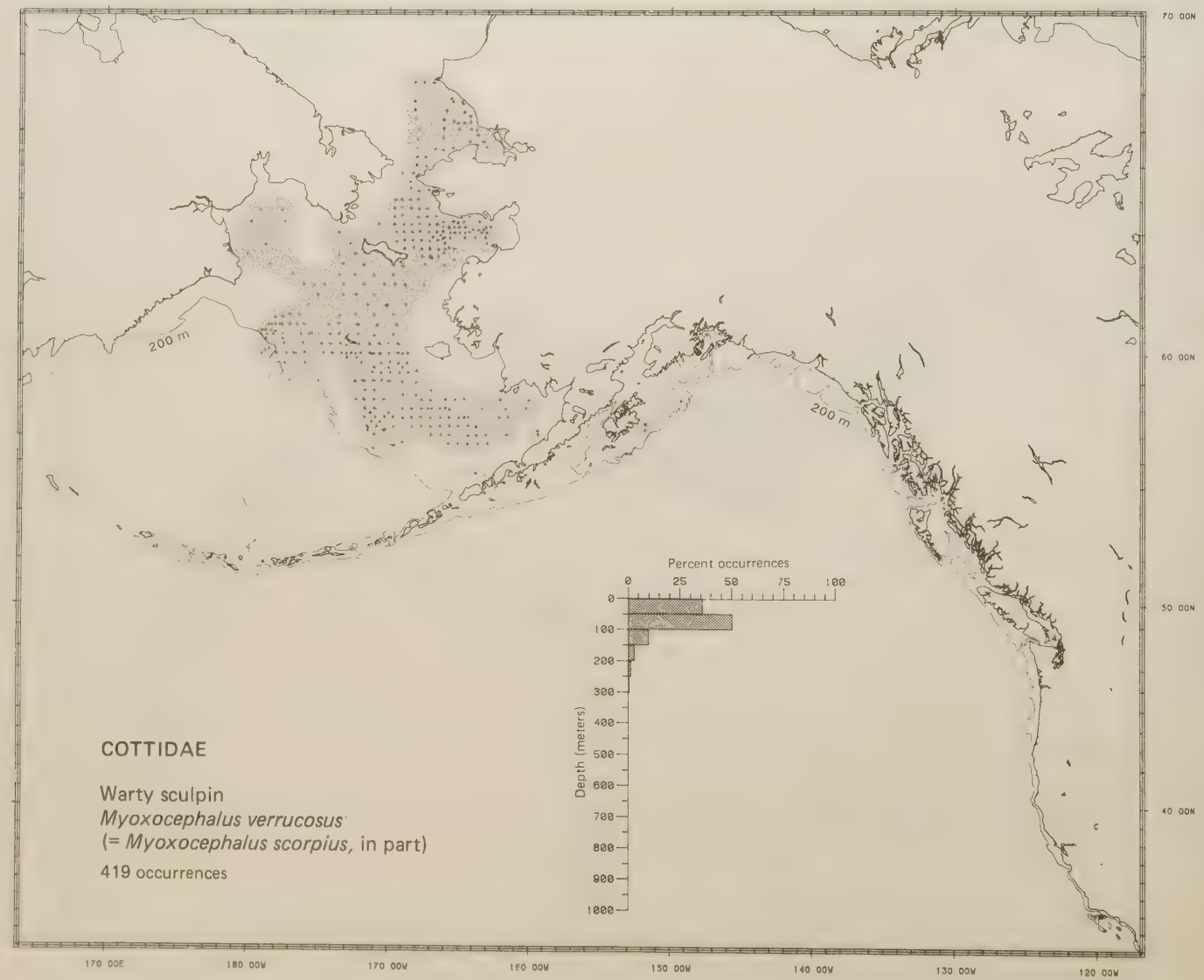
Taxonomic comment The warty sculpin is the Pacific population of the shorthorn sculpin, *Myoxocephalus scorpius* (Linnaeus 1758), of Robins (1980). Neelov (1979), the most recent revision of this genus, regarded this population as a distinct species, *Myoxocephalus verrucosus*. This species has also been called *Myoxocephalus groenlandicus* (Cuvier and Valenciennes 1829) and *Myoxocephalus scorpius groenlandicus* in recent surveys in the Bering Sea and Gulf of Alaska.

Literature Reported from the Laptev and Chukchi Seas in the western Arctic, south in the Bering Sea to the Kamchatka Gulf, along the Aleutian Islands to Adak Island, and east to British Columbia (Wilimovsky 1964; Neelov 1979), at depths of 0 to 550 m (Neelov 1979).

Survey data Found from Point Hope, Alaska, in the Chukchi Sea, south in the eastern Bering Sea to Barykova Point, Siberia, and throughout the middle shelf to the southeast, and to Portlock Bank south of the Kenai Peninsula in the Gulf of Alaska. Depth range 25 to 275 m, most frequently (50.1% of occurrences) on the middle shelf between 50 and 100 m, and 95.5% of occurrences from depths <150 m. Survey data do not expand the known range but provide a more precise distribution in the Bering Sea and a more precise description of depth preference.

Conclusions

Zoogeography	Arctic-Aleutian
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From the Kamchatka Gulf, Adak Island in the Aleutian Islands, and British Columbia north to the Laptev and Chukchi Seas
Depth	0 to 550 m



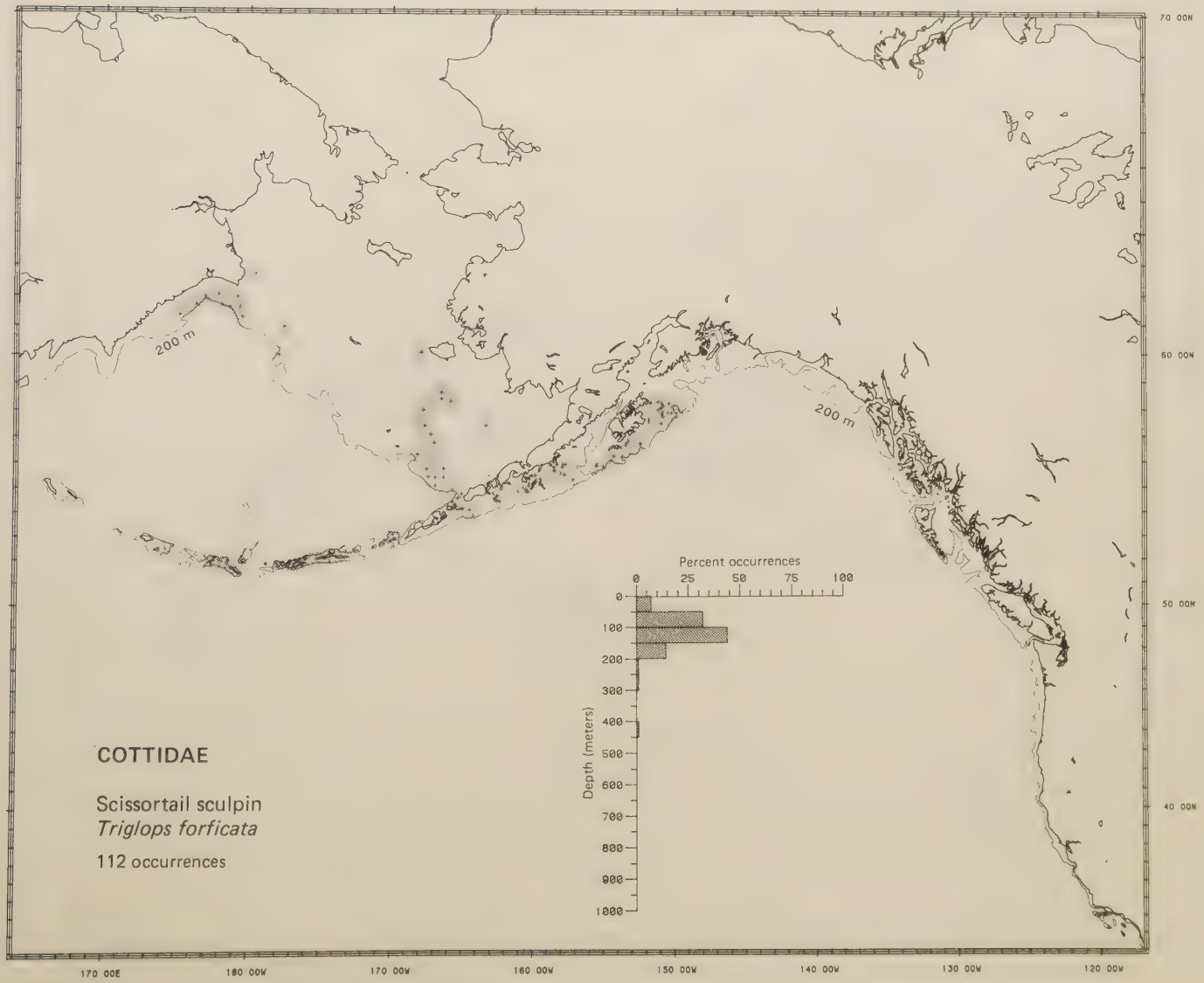
SCISSORTAIL SCULPIN, *Triglops forficata* (Gilbert 1895)

Literature Reported from Amchitka Island in the Aleutian Islands, north to the Bering Sea, and east to Kodiak Island in the Gulf of Alaska (Quast and Hall 1972; Simenstad et al. 1977; Eschmeyer and Herald 1983), at depths of 20 to 340 m (Fedorov 1973a).

Survey data Found from off Cape Nizkiy (on the Korak Coast of the eastern Bering Sea) north to Cape Navarin, southeast in the eastern Bering Sea to Unimak Island, west in the Aleutian Islands to Agattu Island, and east in the Gulf of Alaska to North Albatross Bank off Kodiak Island. Depth range 25 to 425 m, most frequently (43.8% of occurrences) on the outer shelf between 100 and 150 m, and 97.3% of occurrences from depths <200 m. Survey data provide new northern and western limits in the Bering Sea, extend the known limit westward in the Aleutian Islands and slightly eastward in the Gulf of Alaska, and expand its known depth range.

Conclusions

Zoogeography	Aleutian
Life zone	Inner shelf-outer shelf (outer shelf)
Range	From Cape Nizkiy in the western Bering Sea north to Cape Navarin, southeast to Unimak Island, west in the Aleutian Islands to Agattu Island, and east to North Albatross Bank, Kodiak Island, Alaska
Depth	20 to 425 m



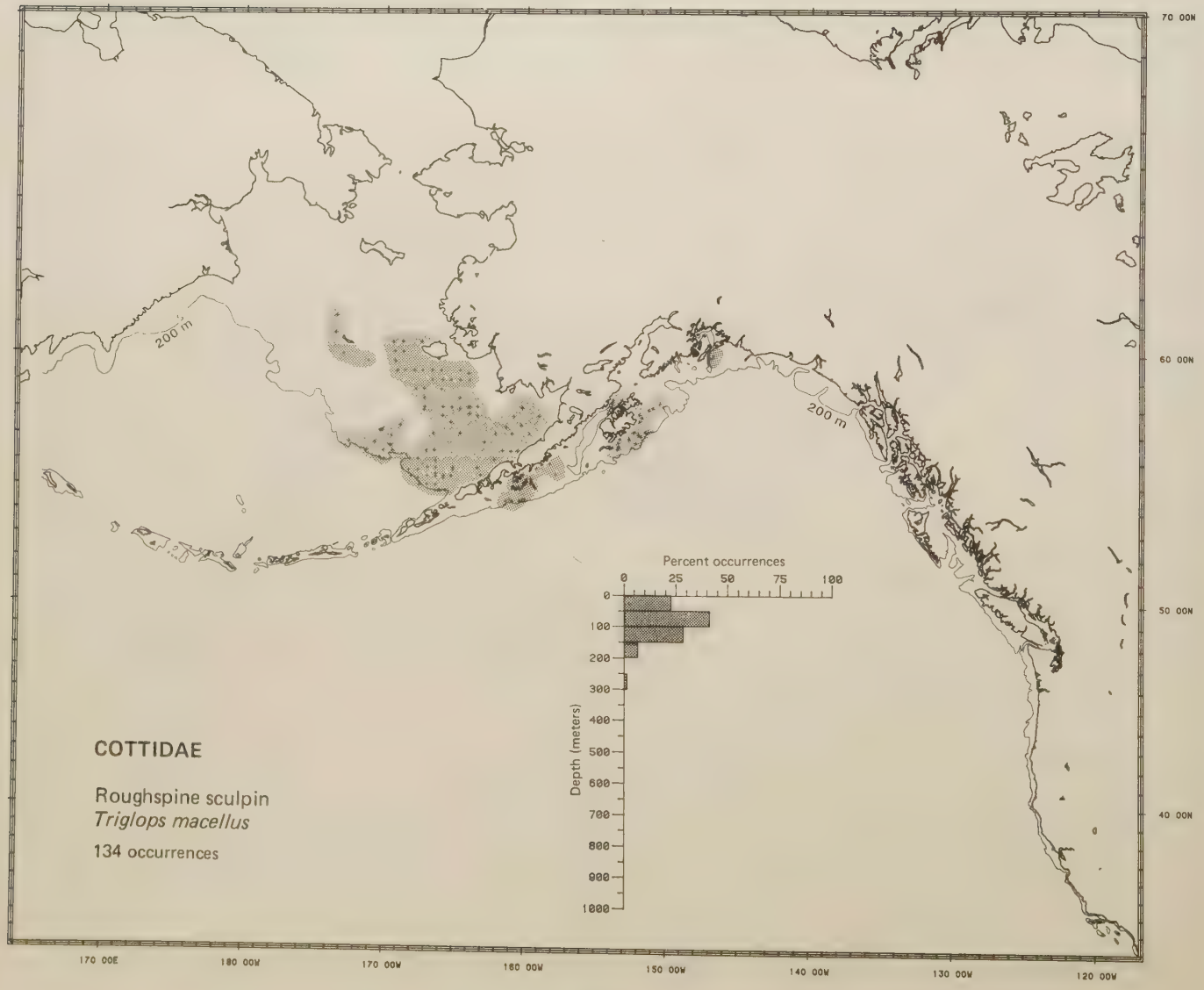
ROUGHSPINE SCULPIN, *Triglops macellus* (Bean 1883)

Literature Reported from the Bering Sea, west in the Aleutian Islands to Amchitka Island, and southeast to Washington (Simenstad et al. 1977; Eschmeyer and Herald 1983), at depths of 18 to 245 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from northwest of Saint Matthew Island and north of Nunivak Island, southeast in the eastern Bering Sea to Unimak Island, and east to Hinchinbrook Island in the northern Gulf of Alaska. Depth range 25 to 275 m, most frequently (41.0% of occurrences) on the middle shelf between 50 and 100 m, and 91.8% of occurrences from depths ≤150 m. Survey data provide a more precise distribution in the Bering Sea and a new maximum depth record.

Conclusions

Zoogeography	Aleutian
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From northwest of Saint Matthew Island and Nunivak Island in the Bering Sea and from Amchitka Island in the Aleutian Islands southeast to Washington
Depth	18 to 275 m



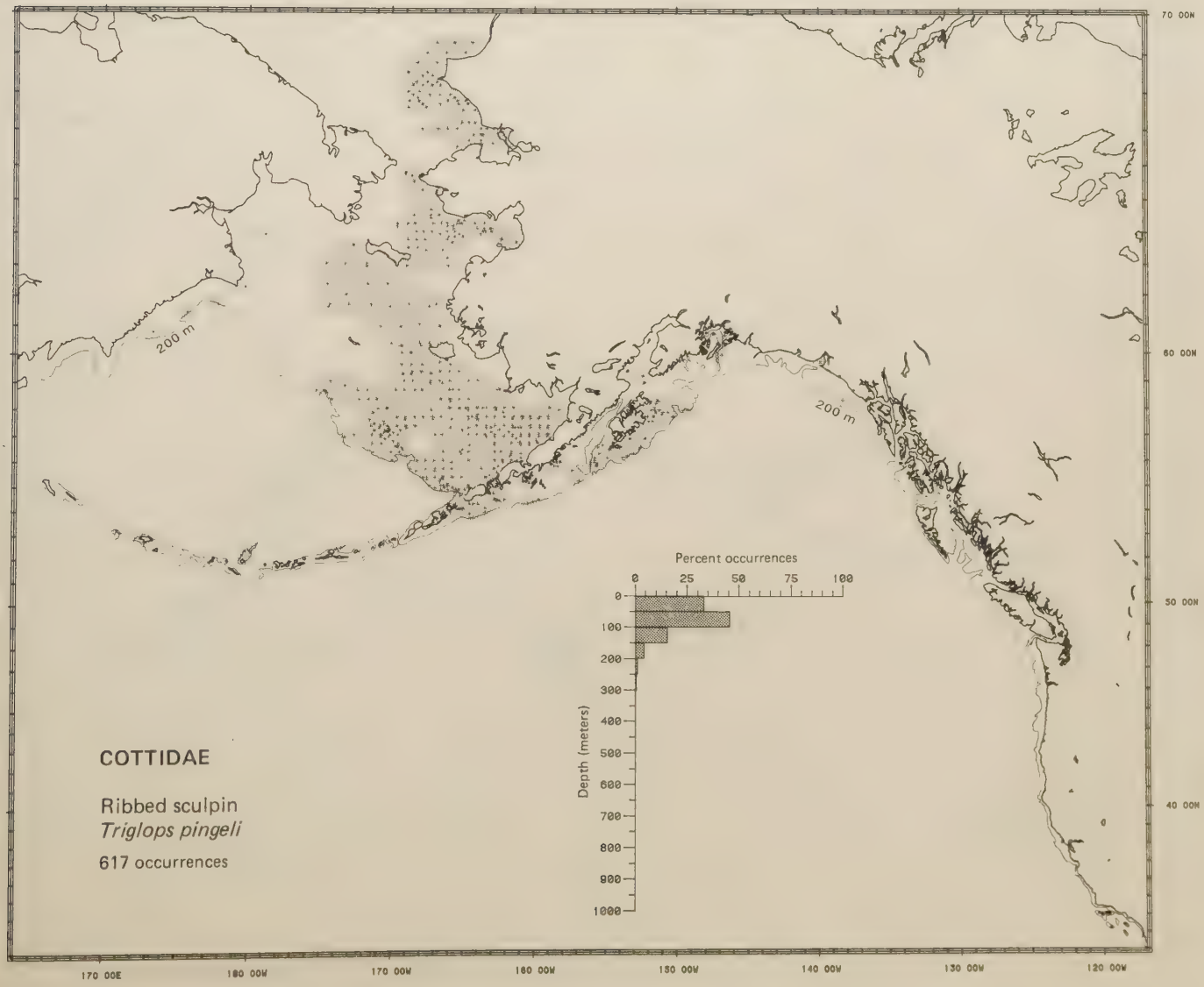
RIBBED SCULPIN, *Triglops pingeli* Reinhardt 1832

Literature Reported from the Sea of Japan off Hokkaido, Amchitka Island in the Aleutian Islands, and Puget Sound, Washington, north to the Arctic (where it is circumpolar) and south in the North Atlantic and eastern Arctic to north of Cape Cod, Massachusetts, western Greenland, Spitsbergen, and the White Sea (Andriyashev 1954; Wilimovsky 1964; Quast and Hall 1972; Hart 1973), from 4 to 482 m depths (Andriyashev 1954; Fedorov 1973a).

Survey data Found from off Glubokaya Bay (on the Korak Coast of the western Bering Sea) north to northeast of Cape Lisburne in the Chukchi Sea, southeast in the eastern Bering Sea to the Alaska Peninsula, west in the Aleutian Islands to Stalemate Bank, and east in the Gulf of Alaska to off Lituya Bay in southeastern Alaska. Depth range 25 to 275 m, most frequently (45.5% of occurrences) on the middle shelf between 50 and 100 m, and 94.0% of occurrences from depths <150 m. Survey data extend the known range west in the Aleutian Islands.

Conclusions

Zoogeography	Arctic-amphiboreal (western boreal Atlantic-northern boreal Pacific)
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From the Sea of Japan, Stalemate Bank in the Aleutian Islands, and Puget Sound, Washington, north throughout the Arctic and south to Cape Cod, Massachusetts, western Greenland, Spitsbergen, and the White Sea
Depth	4 to 482 m



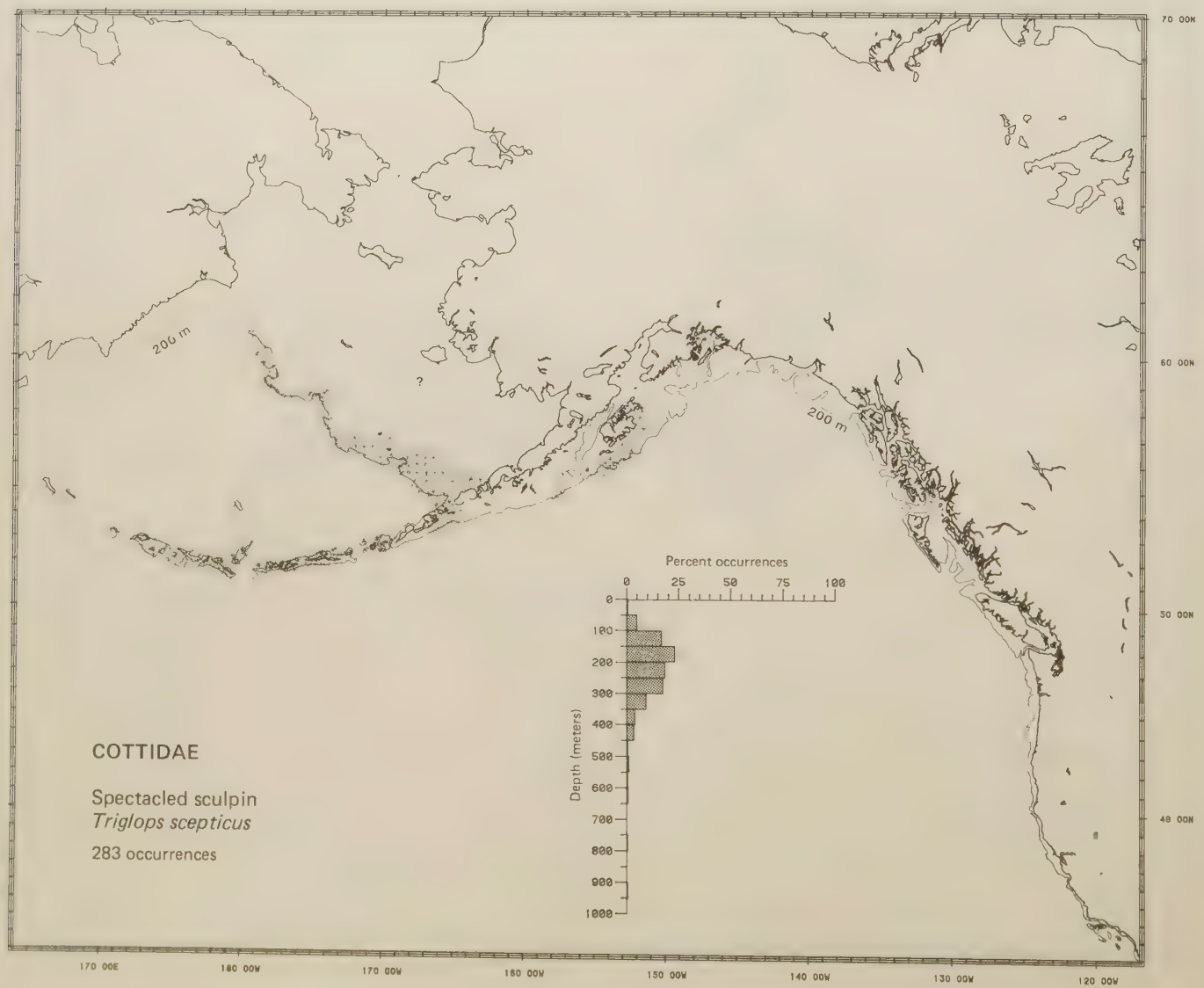
SPECTACLED SCULPIN, *Triglops scepticus* Gilbert 1896

Literature Reported from Hokkaido, Japan, and the Sea of Okhotsk to Cape Olyutorski in the western Bering Sea, west along the Aleutian Islands to Attu Island, and east to southeastern Alaska (Quast and Hall 1972; Eschmeyer and Herald 1983), at depths of 50 to 310 m (Fedorov 1973a; Howe 1981).

Survey data Found from Navarin Canyon southeast along the outer shelf and slope of the eastern Bering Sea to the Alaska Peninsula, west in the Aleutians to Stalemate Bank and Bowers Bank, and east in the Gulf of Alaska to east of Kodiak Island. Depth range 25 to 925 m, most frequently (23.0% of occurrences) on the outer shelf between 150 and 200 m, and 96.8% of occurrences from depths of 50 to 450 m. Survey data define the range in the eastern Bering Sea, slightly extend the known range west in the Aleutian Islands, and expand the known depth range.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From Hokkaido, Japan, and the Sea of Okhotsk north to Navarin Canyon in the Bering Sea, west to Stalemate Bank in the Aleutian Islands, and east to southeastern Alaska
Depth	25 to 925 m



PINK SEAPERCH, *Zalembius rosaceus* (Jordan and Gilbert 1880)

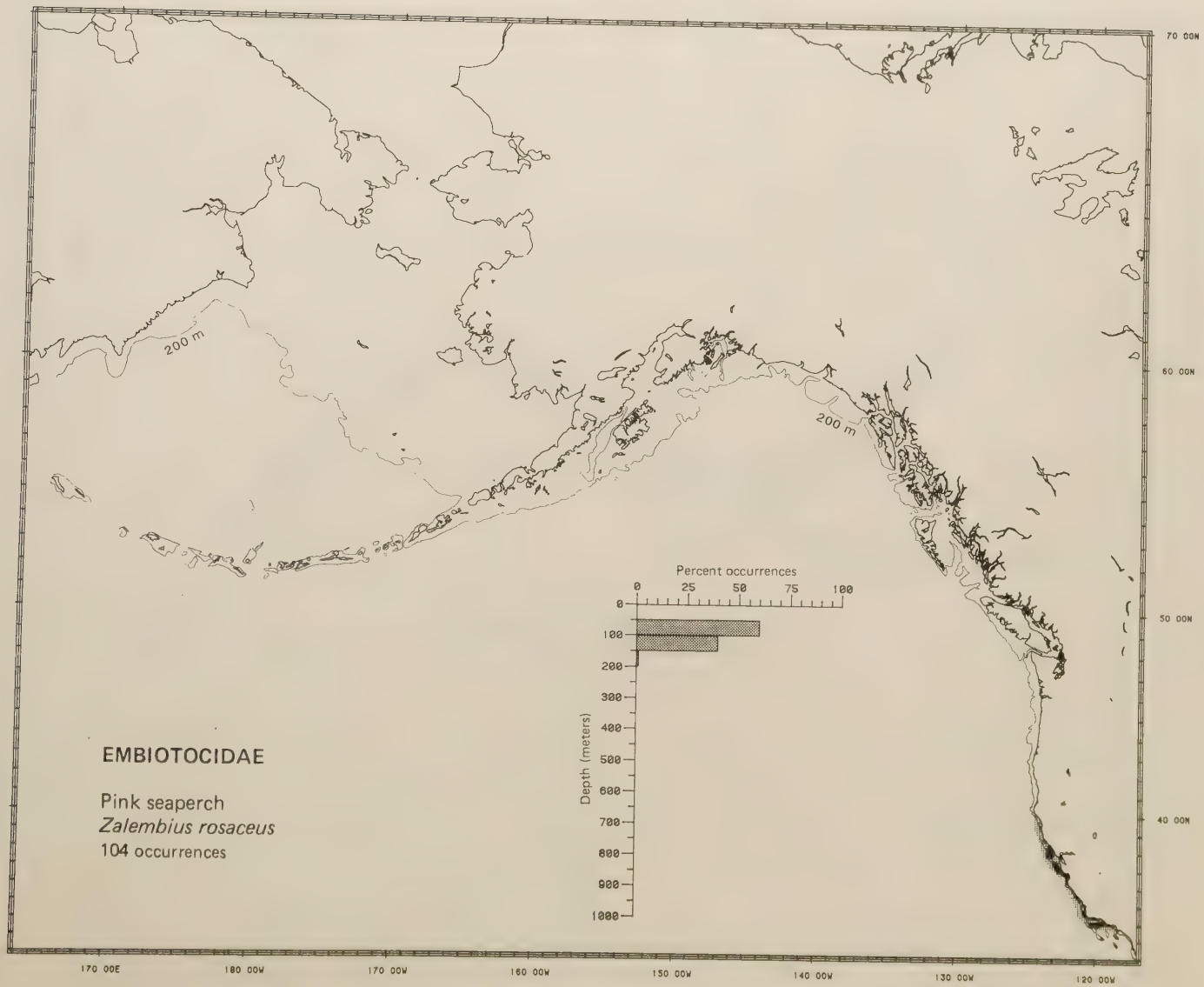
Embiotocidae: Surfperches

Literature Reported from Salt Point in northern California to San Cristobal Bay, Baja California Sur, and in the Gulf of California (Miller and Lea 1972), at depths of 8 to 229 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Point Delgada, California, to Oxnard, California. Depth range 75 to 175 m, most frequently (59.6% of occurrences) on the middle shelf between 50 and 100 m, and 99.0% of occurrences between depths of 50 and 150 m. Survey data extend the known range to the north.

Conclusions

Zoogeography	Oregonian-Californian
Life zone	Middle shelf-outer shelf (middle shelf)
Range	From Point Delgada, California, to San Cristobal Bay, Baja California Sur, and in the Gulf of California
Depth	8 to 229 m

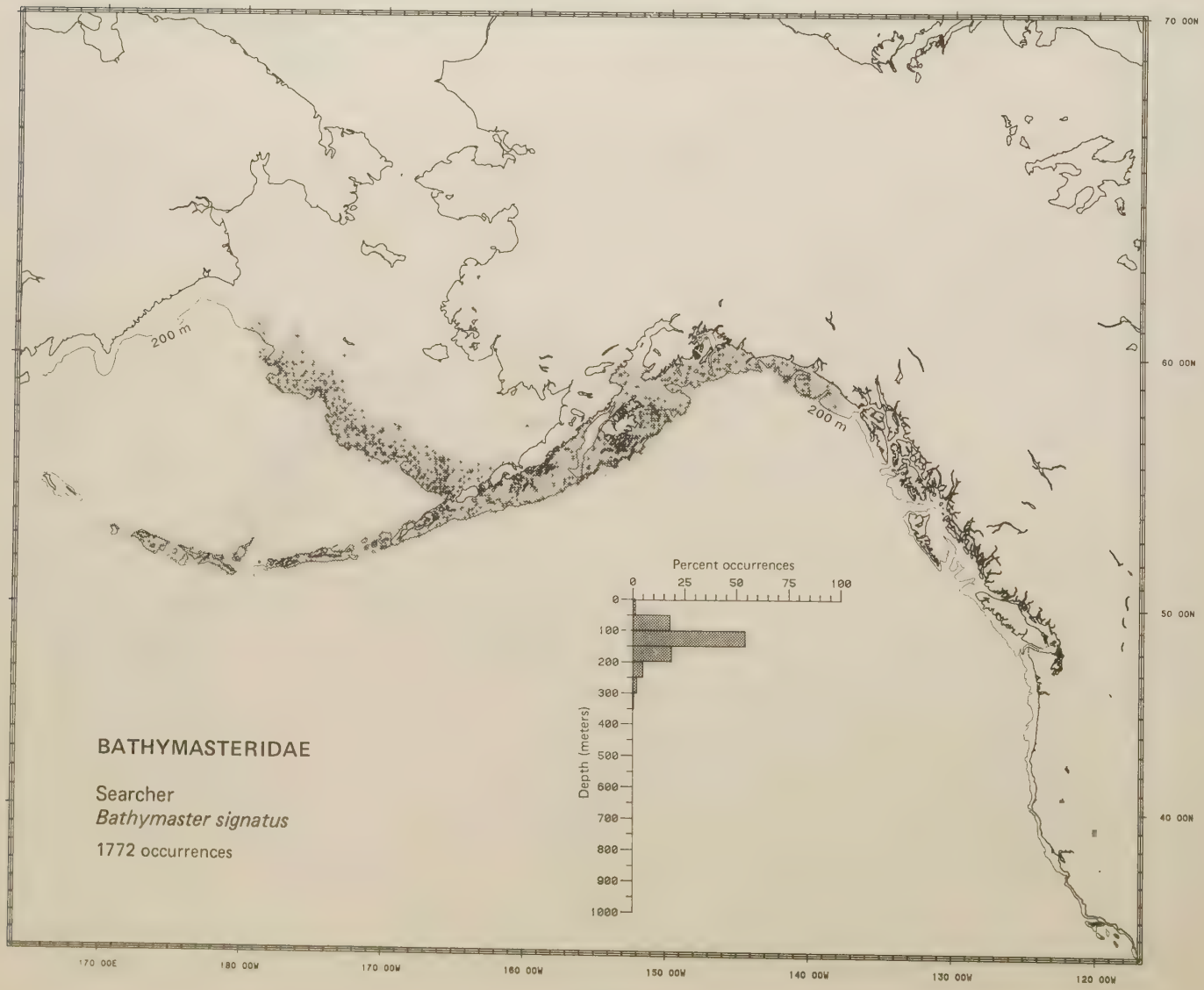


Literature Reported from eastern Kamchatka and the Commander Islands to the East Siberian Sea in the Arctic, south through the Bering Sea, west in the Aleutian Islands to Amchitka Island, and east to Washington (Quast and Hall 1972; Simenstad et al. 1977; Eschmeyer and Herald 1983), at depths of 0 to 380 m (Fedorov 1973a; Howe 1981).

Survey data Found from Navarin Canyon on the northwestern slope of the eastern Bering Sea, southeast along the outer shelf and slope to the Alaska Peninsula and Unimak Island, west in the Aleutian Islands to Stalemate Bank, and east to Cape Spencer in southeast Alaska. Depth range 25 to 825 m, most frequently (54.0% of occurrences) on the outer shelf between 100 to 150 m, and 95.4% of occurrences from depths of 50 to 250 m. Survey data extend the known range west in the Aleutian Islands and provide a new depth record.

Conclusions

Zoogeography	Arctic-Aleutian
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From eastern Kamchatka and the Commander Islands, Stalemate Bank in the Aleutian Islands, and Washington north to the East Siberian Sea
Depth	0 to 825 m



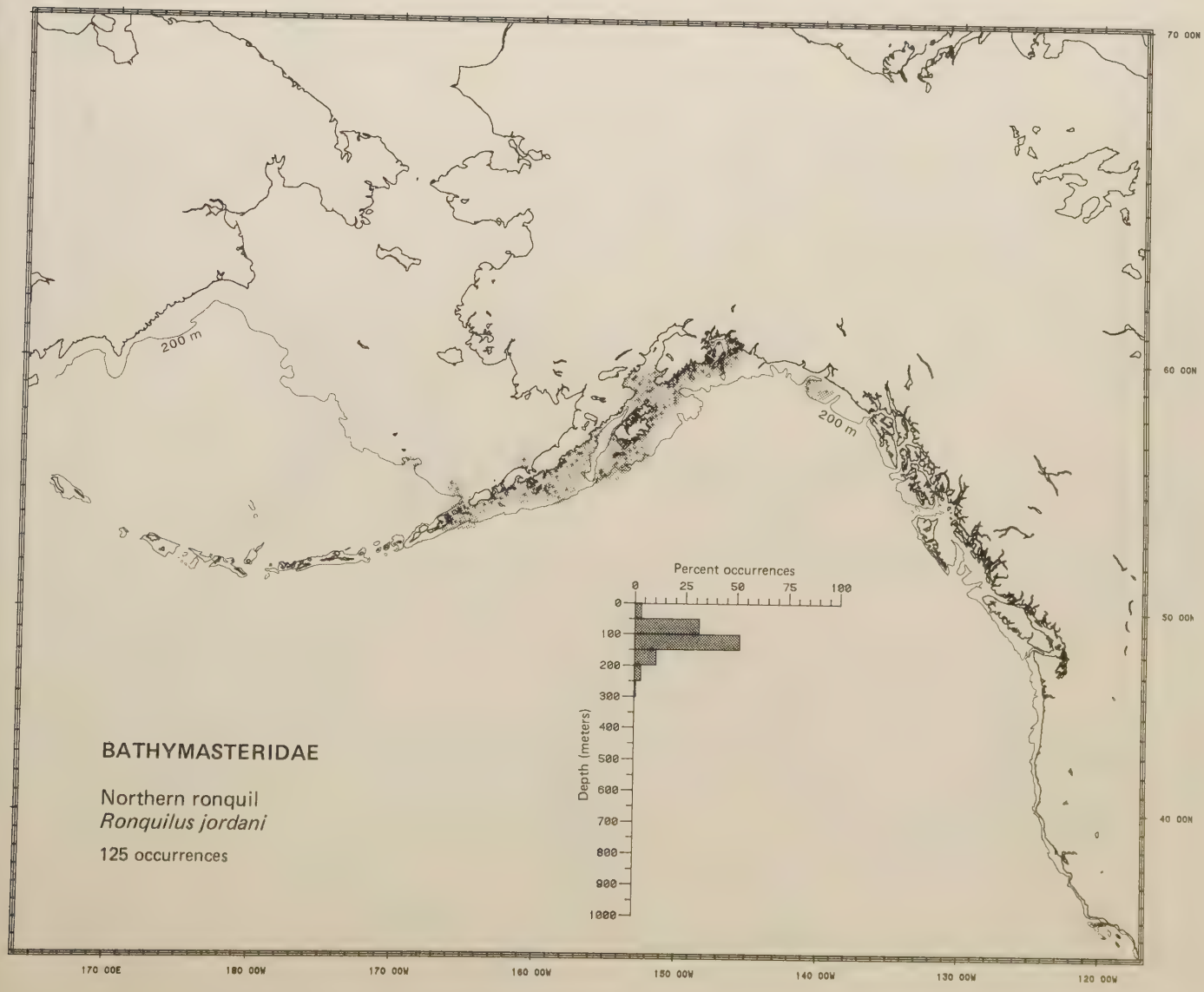
NORTHERN RONQUIL, *Ronquilus jordani* (Gilbert 1889)

Literature Reported from the Bering Sea and Amchitka Island in the Aleutian Islands to Monterey, California (Miller and Lea 1972; Simenstad et al. 1977), at depths of 3 to 180 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Pribilof Canyon in the southeastern Bering Sea and Unalaska Island in the Aleutian Islands east to off Yakutat Bay in southeastern Alaska. Depth range 25 to 275 m, most frequently (51.2% of occurrences) on the outer shelf between 100 and 150 m, and 96.0% of occurrences from depths ⩽200 m. Survey data provide a more precise range in the Bering Sea and a new maximum depth record.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-outer shelf (outer shelf)
Range	From Pribilof Canyon in the Bering Sea and Amchitka Island in the Aleutian Islands to Monterey, California
Depth	3 to 275 m



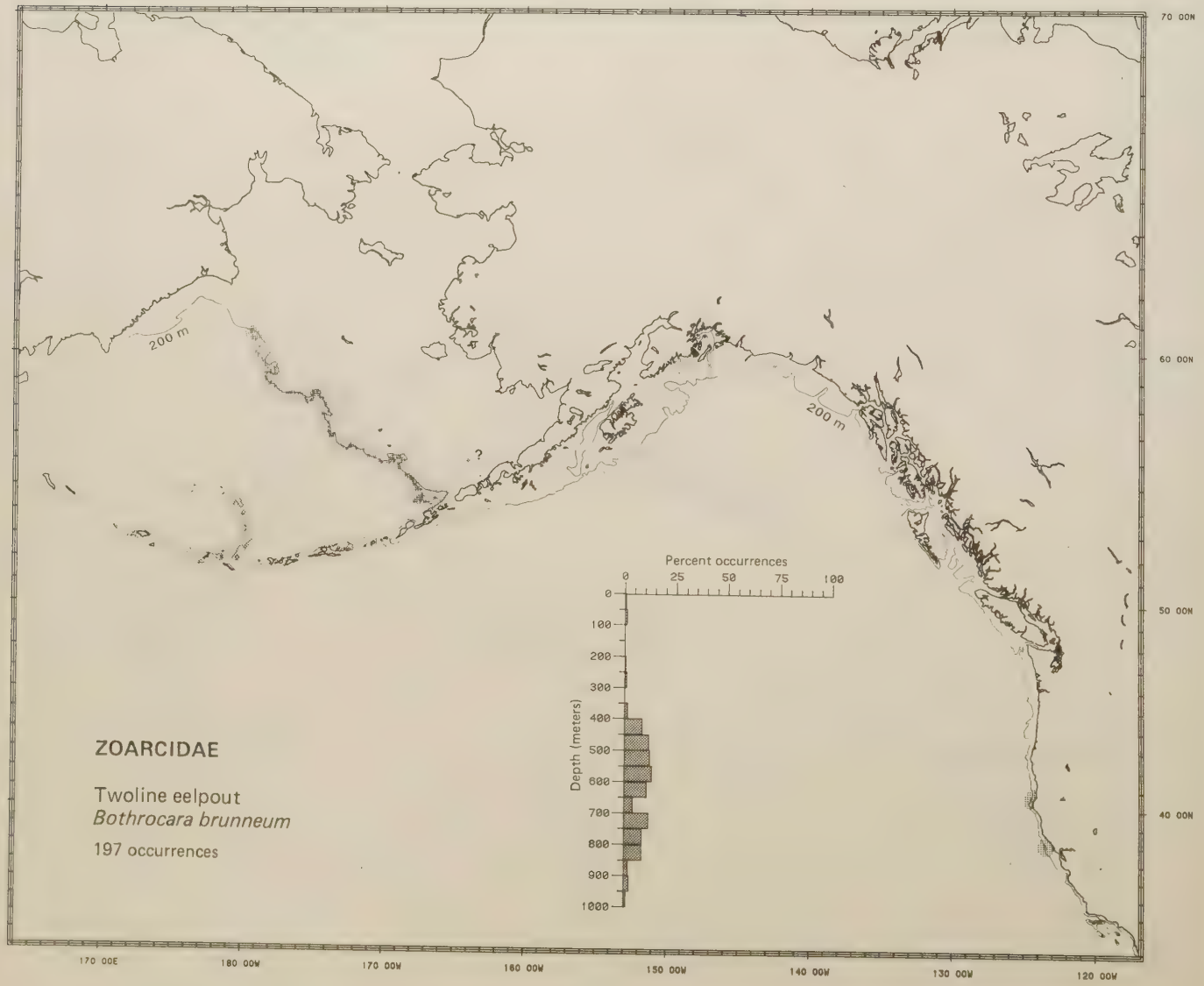
TWOLINE EELPOUT, *Bothrocara brunneum* (Bean 1890)

Literature Reported from Sakhalin, U.S.S.R., in the Sea of Okhotsk to Olyutorski Bay in the western Bering Sea and southeast to the Coronado Islands, Baja California (Miller and Lea 1972; Quast and Hall 1972; Hart 1973), at depths of 199 to 1829 m (Eschmeyer and Herald 1983).

Survey data Found from Navarin Canyon on the northwest slope of the eastern Bering Sea southeast to the slope north of Akutan Island and west in the Aleutian Islands to Attu Island and the Ulm Plateau. Depth range 25 to 1025 m, most frequently (13.2% of occurrences) on the bathybenthal slope between 550 and 600 m, and 95.5% of occurrences from depths of 350 to 950 m. Survey data provide a new northern limit in the eastern Bering Sea, extend the known range west in the Aleutian Islands, and provide a new shallow depth record. The occurrence of this species on the middle shelf in the southeastern Bering Sea appears to be anomalous.

Conclusions

Zoogeography	Northeastern boreal Pacific
Life zone	Mesobenthal-bathybenthal (bathybenthal)
Range	From Sakhalin to Navarin Canyon in the Bering Sea, west in the Aleutian Islands to Attu Island, and southeast to the Coronado Islands, Baja California
Depth	199 (possibly 25) to 1829 m



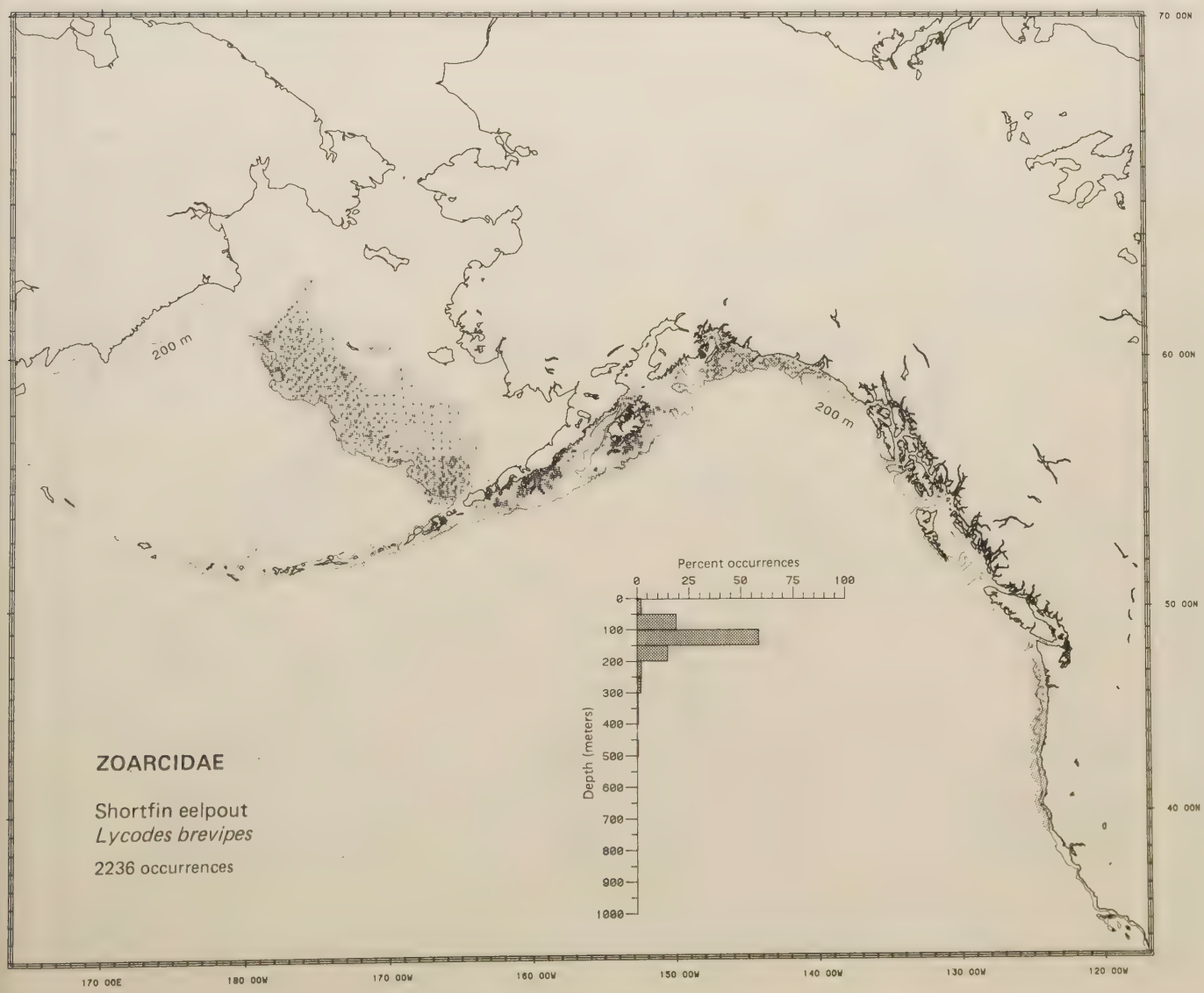
SHORTFIN EELPOUT, *Lycodes brevipes* Bean 1890

Literature Reported from the Sea of Okhotsk to the Anadyr Gulf in the Bering Sea, in the Aleutian Islands, southeast to Oregon (Andriyashev 1954; Okada and Kobayashi 1968; Eschmeyer and Herald 1983), at depths of 27 to 973 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from east of Cape Navarin, southeast along the outer shelf and slope in the eastern Bering Sea to Unimak Island, west in the Aleutian Islands to Unalaska Island, and southeast to Fort Bragg, California. Depth range 25 to 875 m, most frequently (58.5% of occurrences) on the outer shelf between 100 and 150 m, and 96.0% of occurrences from depths ≤250 m. There is one highly questionable record of this species from Kotzebue Sound in the Chukchi Sea. Survey data extend the known geographic range west in the Aleutian Islands and south to California, and provide a slightly shallower depth record.

Conclusions

Zoogeography	Northeastern boreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From the Sea of Okhotsk to the Anadyr Gulf in the Bering Sea, west in the Aleutian Islands to Unalaska Island, and southeast to Fort Bragg, California
Depth	25 to 973 m



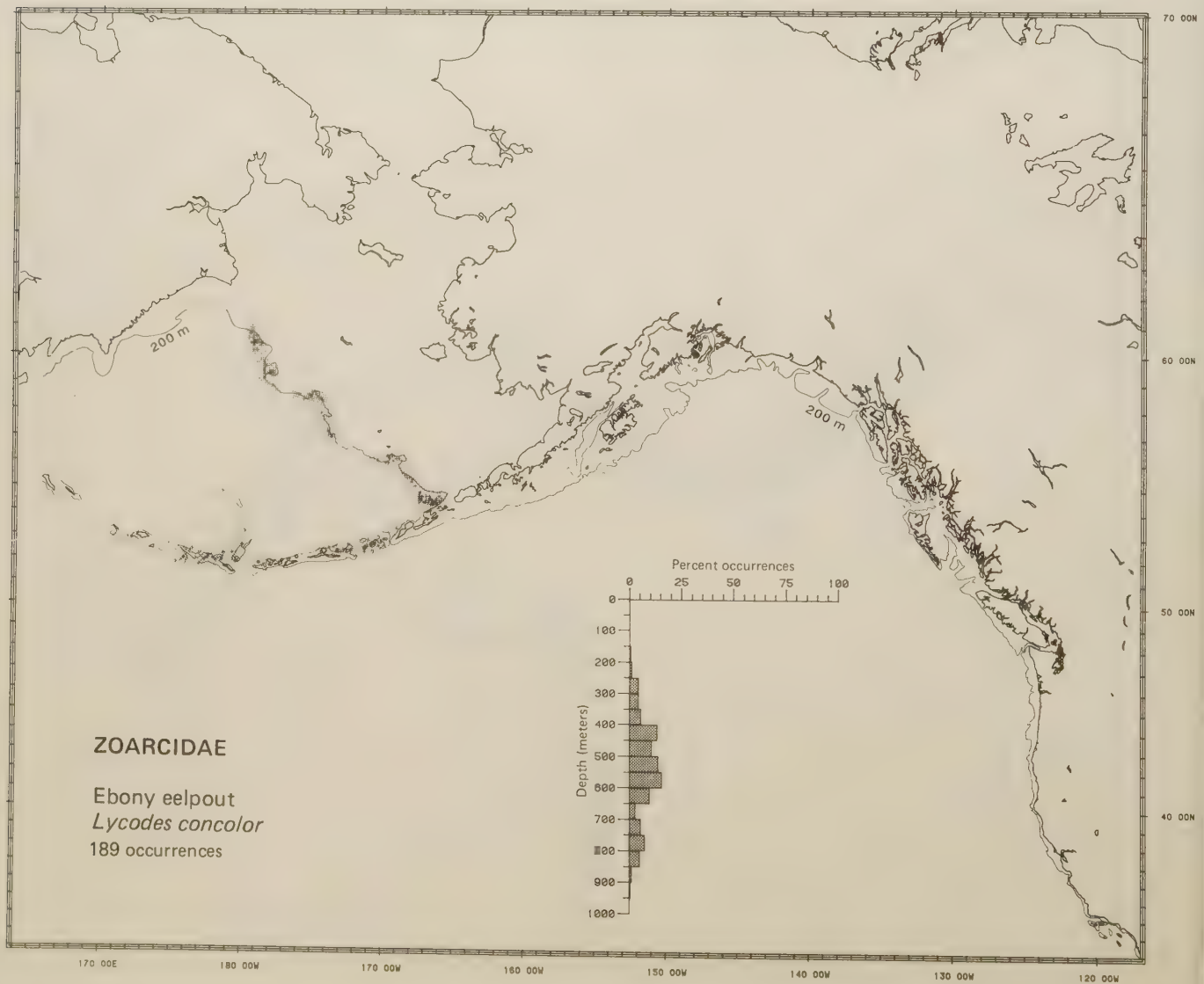
Taxonomic comment The ebony eelpout, *Lycodes concolor*, as construed by E. M. Anderson (Dep. Ichthyol., Calif. Acad. Sci., San Francisco, CA 94118, pers. commun. April 1984), includes both *L. andriashevi* Fedorov 1966 and *L. soldatovi* Taranets and Andriyashev 1935 as junior synonyms. All records of the species in this survey were identified in the field as *L. soldatovi*.

Literature Reported from the Sea of Okhotsk to Cape Olyutorski in the western Bering Sea and southeast to the eastern Bering Sea (Fedorov 1966; Quast and Hall 1972), at depths of 42 to 550 m (Howe 1981).

Survey data Found from Navarin Canyon on the northwest slope of the eastern Bering Sea southeast to the slope north of Akutan Island, and west along the Aleutian Islands to Stalemate Bank and Bowers Bank. Depth range 175 to 1025 m, most frequently (15.3% of occurrences) on the bathybenthal slope between 550 and 600 m, and 96.3% of occurrences from depths of 250 to 850 m. Survey data provide a more precise distribution of this species in the eastern Bering Sea, extend its known range west along the Aleutian Islands, and provide a new maximum depth record.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Mesobenthal-bathybenthal (bathybenthal)
Range	From the Sea of Okhotsk north to Navarin Canyon in the Bering Sea, southeast to Akutan Island, and west to Stalemate Bank in the Aleutian Islands
Depth	42 to 1025 m



BIGFIN EELPOUT, *Lycodes cortezianus* (Gilbert 1890)

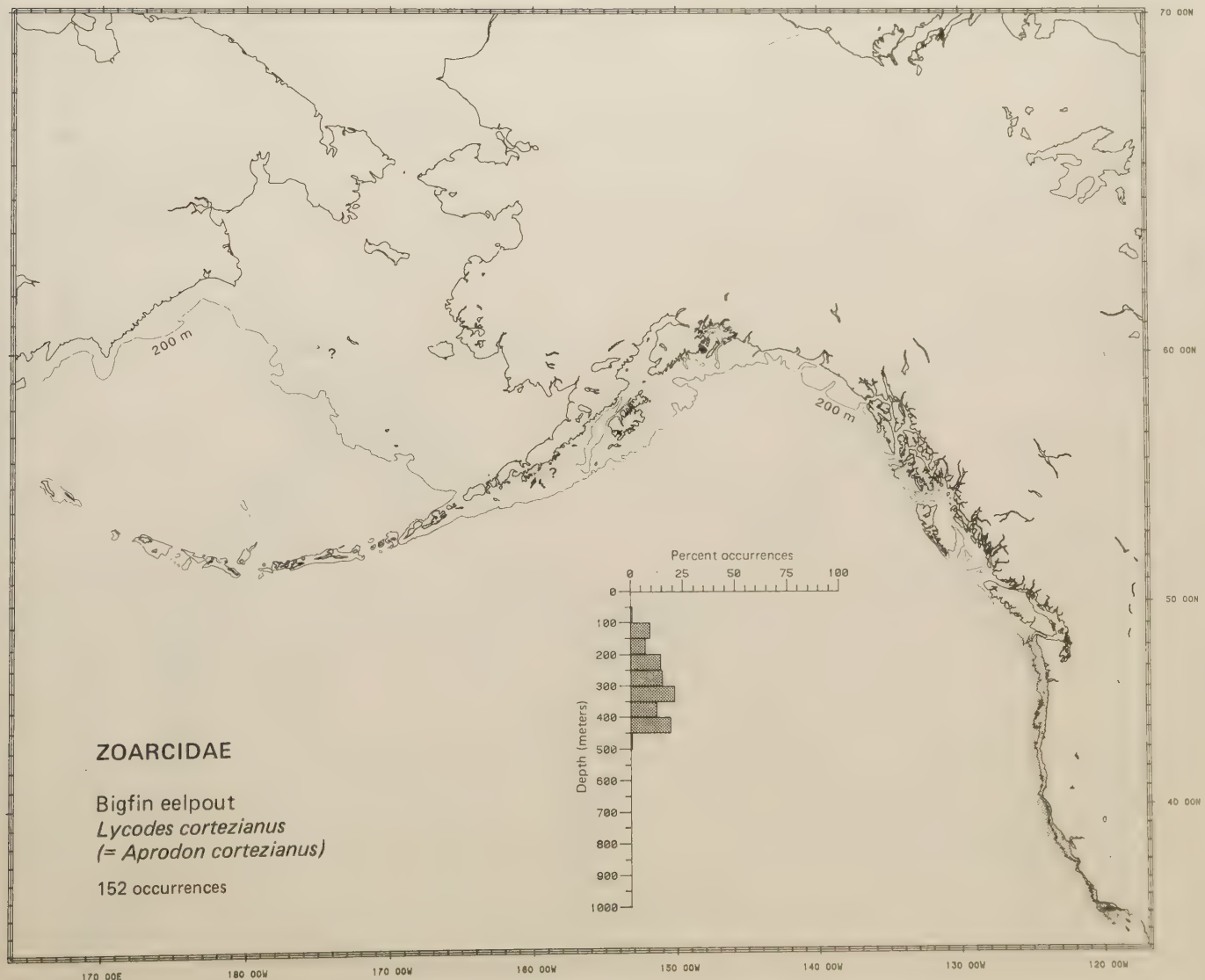
Taxonomic comment The bigfin eelpout is *Aprodon cortezianus* in Robins (1980), but Eschmeyer and Herald (1983) and E. M. Anderson (Dep. Ichthyol., Calif. Acad. Sci., San Francisco, CA 94118, pers. commun. April 1984) place this species in the genus *Lycodes*.

Literature Reported from Queen Charlotte Sound, British Columbia, to San Diego, California (Miller and Lea 1972), at depths of 73 to 800 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Prince of Wales Island, Alaska, south to the Santa Barbara Channel, California. There is a highly questionable record of this species from west of Saint Matthew Island in the eastern Bering Sea and a questionable record off Stepovak Bay on the Alaska Peninsula in the Gulf of Alaska. Found at depths of 75 to 475 m, most frequently (21.1% of occurrences) on the mesobenthal slope between 300 and 350 m, and 98.6% of occurrences from depths of 100 to 450 m. Survey data extend the known geographic range to the north to at least Prince of Wales Island, Alaska.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Outer shelf-mesobenthal (mesobenthal)
Range	From Prince of Wales Island, Alaska (or, questionably, from Saint Matthew Island in the Bering Sea and Stepovak Bay in the western Gulf of Alaska) south to San Diego, California
Depth	73 to 800 m



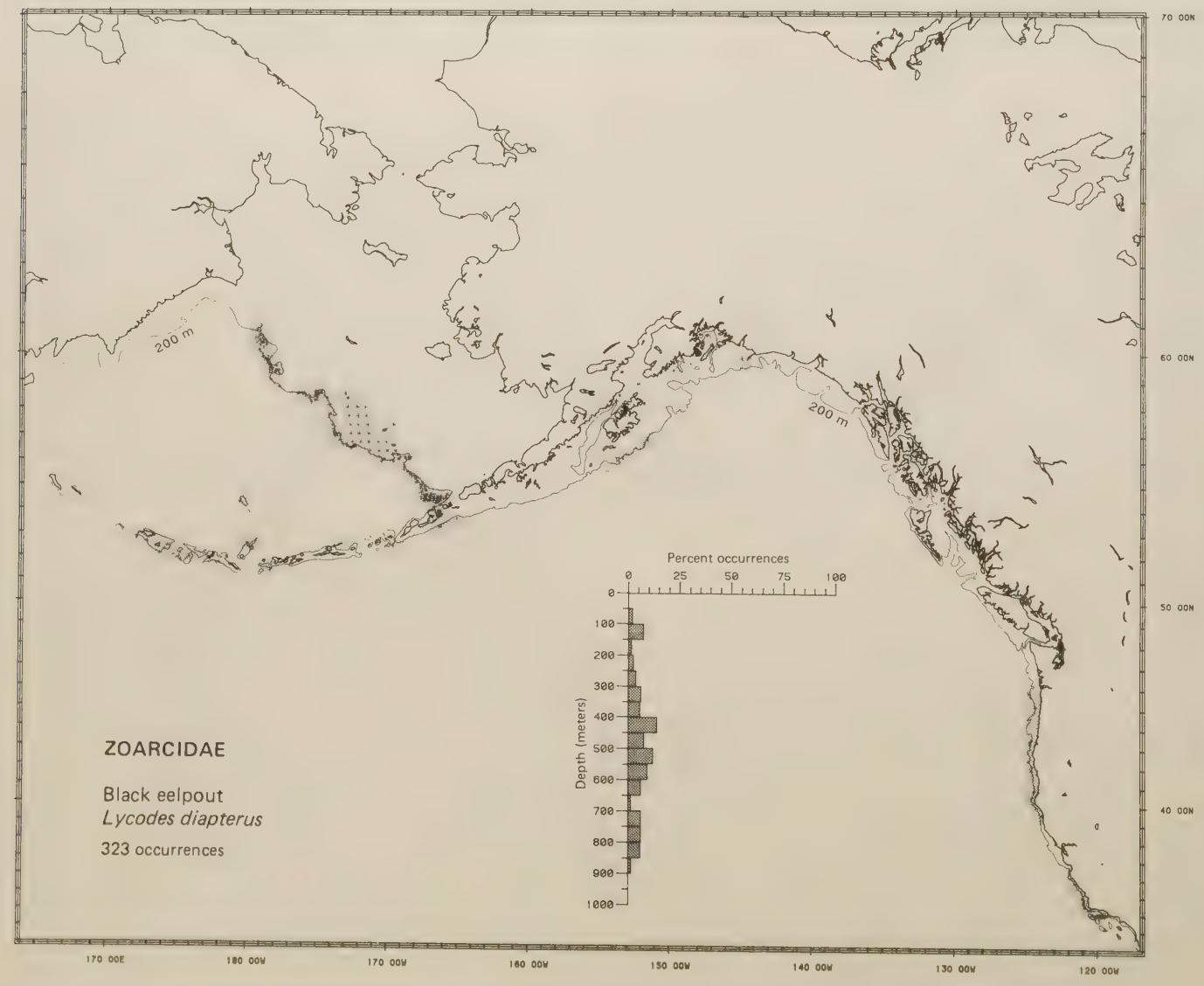
BLACK EELPOUT, *Lycodes diapterus* Gilbert 1892

Literature Reported from the Sea of Japan (and the Sea of Okhotsk) to the northwest Bering Sea and south to San Diego, California (Shmidt 1950; Miller and Lea 1972; Hart 1973), at depths of 13 to 1300 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Navarin Canyon on the northwest slope of the eastern Bering Sea southeast to Akutan Island, west along the Aleutian Islands to Attu Island and Bowers Bank, and southeast to the Santa Barbara Channel, California. Depth range 25 to 1025 m, most frequently (13.9% of occurrences) on the mesobenthal slope between 400 and 450 m, and 95.6% of occurrences from depths of 100 to 850 m. Survey data provide a more precise distribution in the Bering Sea and extend the known range west in the Aleutian Islands.

Conclusions

Zoogeography	Northeastern boreal Pacific
Life zone	Outer shelf-bathybenthal (mesobenthal)
Range	From the Sea of Japan to Navarin Canyon in the Bering Sea, west to Attu Island in the Aleutian Islands, and southeast to San Diego, California
Depth	13 to 1300 m

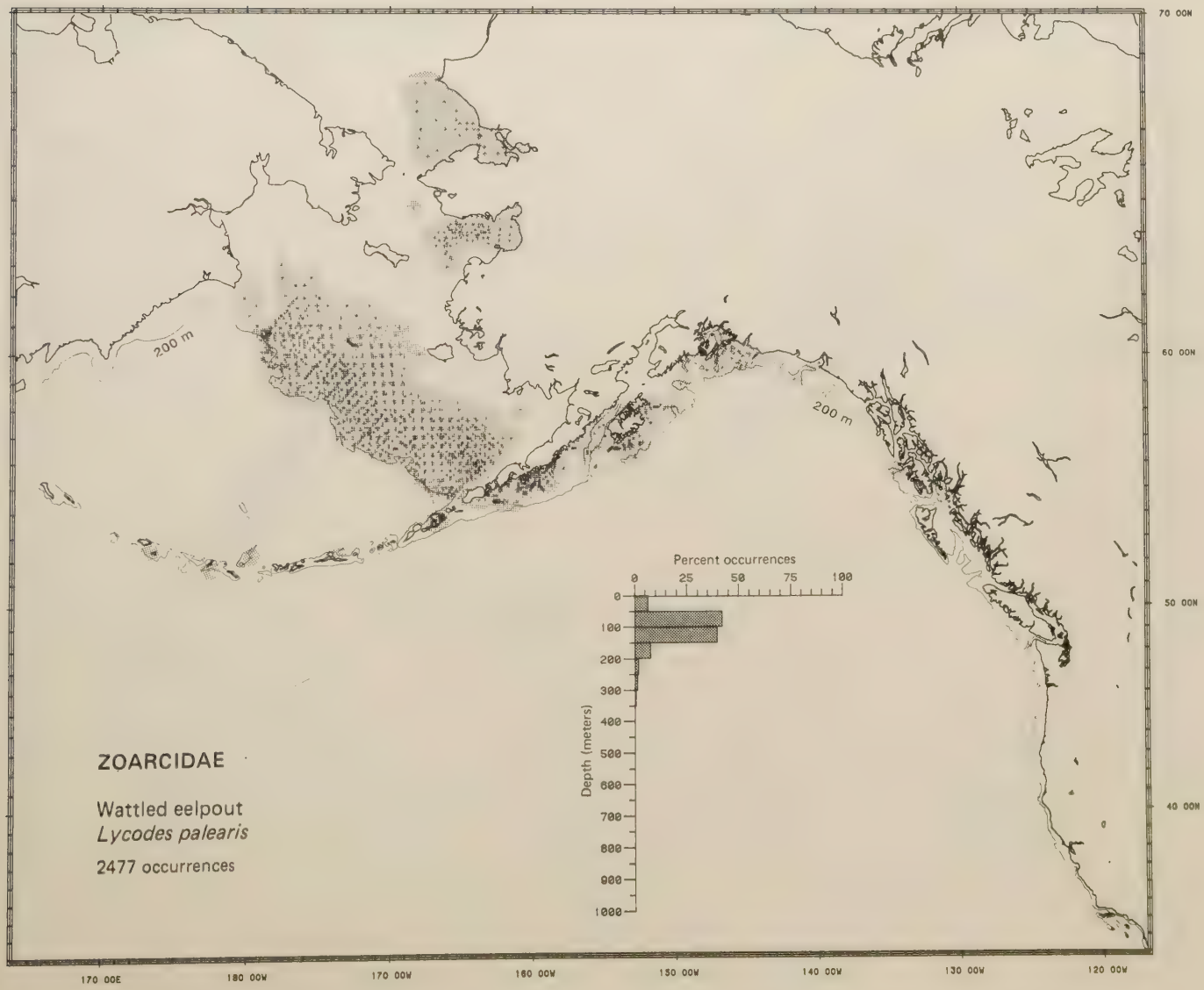


Literature Reported from Peter the Great Bay in the Sea of Japan and the Sea of Okhotsk north to the Chukchi Sea and south to Oregon (Quast and Hall 1972; Hart 1973; Eschmeyer and Herald 1983), at depths of 29 to 316 m (Andriyashev 1954; Fedorov 1973a).

Survey data Found from Point Hope in the Chukchi Sea, south in the eastern Bering Sea to Cape Navarin in the west and to Unimak Island in the southeast, west along the Aleutian Islands to Agattu Island, and east to Dundas Island, Dixon Entrance, British Columbia. Depth range 25 to 925 m, most frequently (42.1% of occurrences) on the middle shelf between 50 and 100 m, and 95.9% of occurrences from depths ⩽200 m. Survey data extend the known range west in the Aleutian Islands and provide a new maximum depth record.

Conclusions

Zoogeography	Arctic-circumboreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Peter the Great Bay in the Sea of Japan and the Sea of Okhotsk, Agattu Island in the Aleutian Islands, and Oregon north to Point Hope in the Chukchi Sea
Depth	25 to 925 m

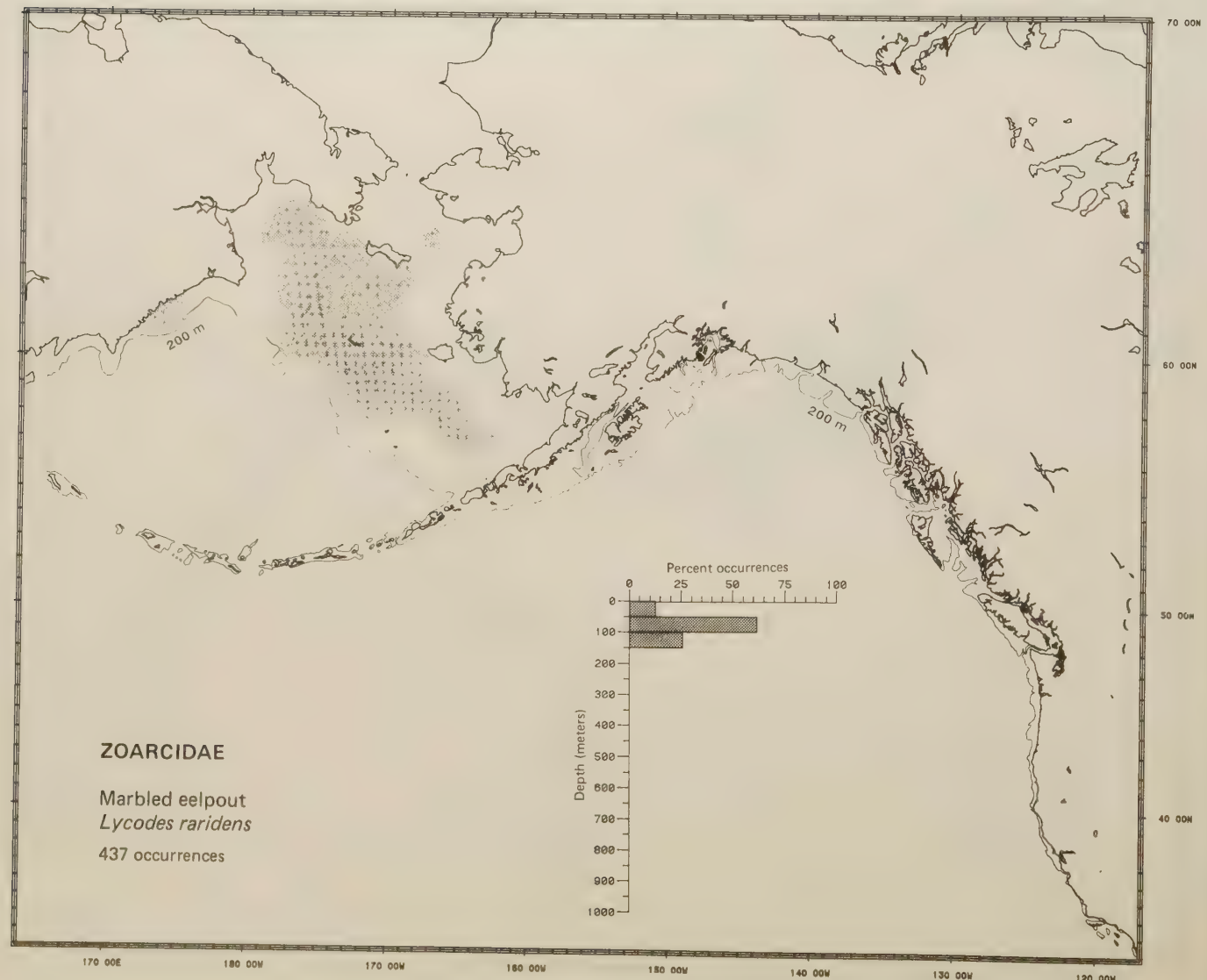


Literature Reported from southeastern Sakhalin, U.S.S.R., and the Sea of Okhotsk to the Alaskan Arctic, extending through the Bering Sea west of Saint Matthew Island (Andriyashev 1954; Quast and Hall 1972), at depths of 42 to 130 m (Howe 1981).

Survey data Found from off Dezhneva Bay (on the Korak Coast of the western Bering Sea) north to the northern Anadyr Gulf and western Norton Sound and southeast to west-central Bristol Bay. Depth range 25 to 175 m, most frequently (61.6% of occurrences) on the middle shelf between 50 and 100 m, and 99.8% of occurrences from depths ⩽150 m. Survey data extend the known range southeast in the Bering Sea and expand the known depth range.

Conclusions

Zoogeography	Arctic-Okhotsk
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Sakhalin, the Sea of Okhotsk, and west-central Bristol Bay in the Bering Sea north to the Alaskan Arctic
Depth	25 to 175 m

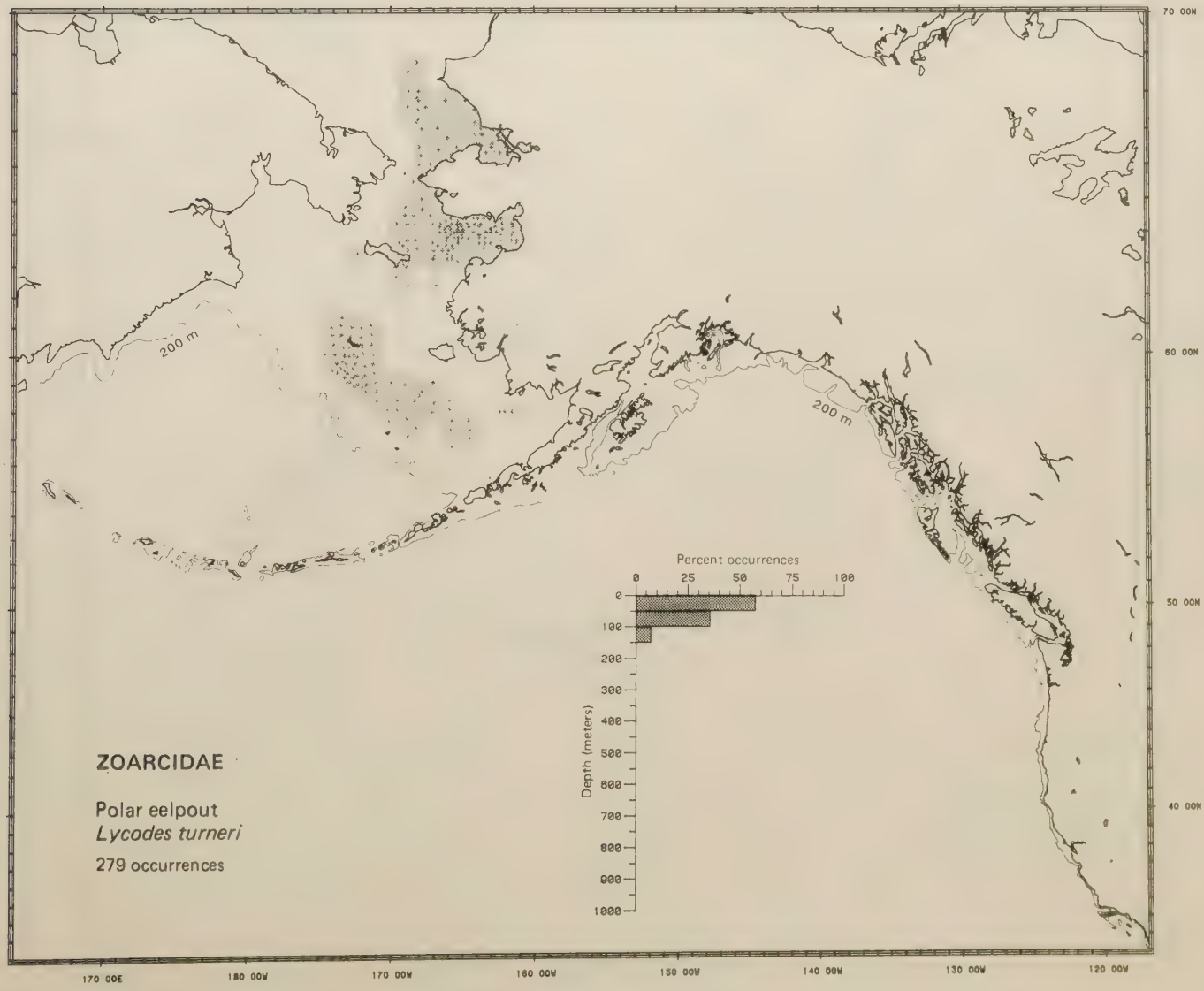


Literature Reported from the Anadyr Gulf and Norton Sound in the northern Bering Sea, north to the Alaskan Arctic and the Kara Sea, and in the North Atlantic from western Greenland and Hamilton Inlet, Labrador, south to the northern Gulf of Saint Lawrence (Andriyashev 1954; Leim and Scott 1966; Okada and Kobayashi 1968), from "shallow" to 64 m (Howe 1981).

Survey data Found from west of Cape Lisburne in the Chukchi Sea south in the eastern Bering Sea to west-central Bristol Bay. Depth range 25 to 125 m, most frequently (57.3% of occurrences) on the inner shelf at depths <50 m, and 92.8% of occurrences from depths <100 m. Survey data extend the known range south in the Bering Sea and expand the known depth range.

Conclusions

Zoogeography	Arctic-western boreal Atlantic
Life zone	Inner shelf-middle shelf (inner shelf)
Range	From west-central Bristol Bay in the Bering Sea north to the Alaskan Arctic and the Kara Sea, and in the North Atlantic from western Greenland and Hamilton Inlet, Labrador, south to the northern Gulf of Saint Lawrence
Depth	25 to 125 m



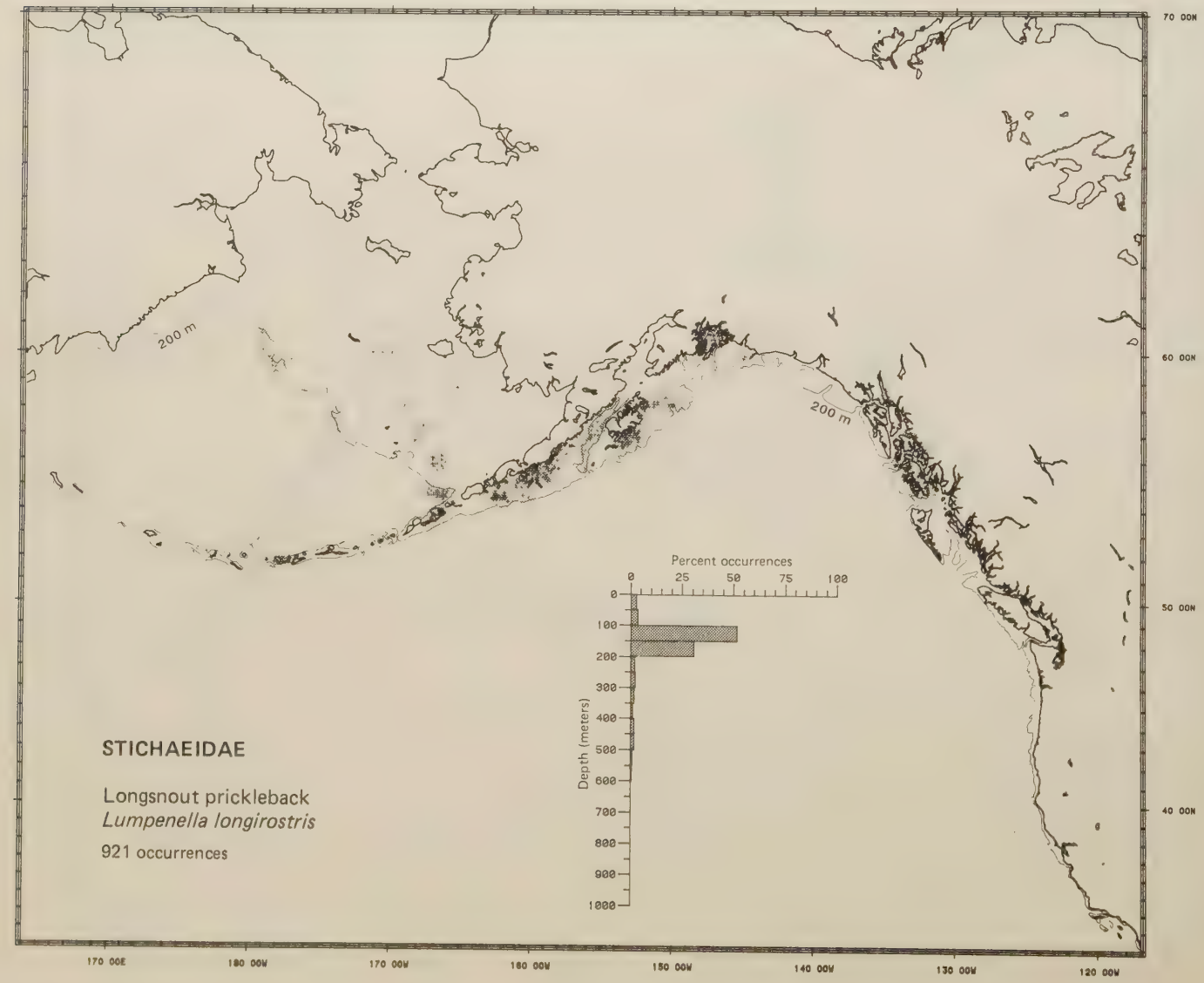
LONGSNOUT PRICKLEBACK, *Lumpenella longirostris* (Evermann and Goldsborough 1907)

Literature Reported from the Sea of Okhotsk to the Bering Sea and southeast to Burrard Inlet, British Columbia (Quast and Hall 1972; Howe 1981; Eschmeyer and Herald 1983), at depths of 91 to 600 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from Navarin Canyon on the northwest slope of the eastern Bering Sea and from east of Saint Matthew Island south to the slope north of Akutan Island, west in the Aleutian Islands to Tanaga Island, and east to Dixon Entrance in southeast Alaska. Depth range 25 to 825 m, most frequently (51.6% of occurrences) on the outer shelf between 100 and 150 m, and 94.9% of occurrences from depths <400 m. Survey data provide a more precise distribution of this species in the Bering Sea, extend its known range west in the Aleutian Islands, and expand its known depth range.

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From the Sea of Okhotsk north to Navarin Canyon in the Bering Sea, west to Tanaga Island in the Aleutian Islands, and east to Burrard Inlet, British Columbia
Depth	25 to 825 m



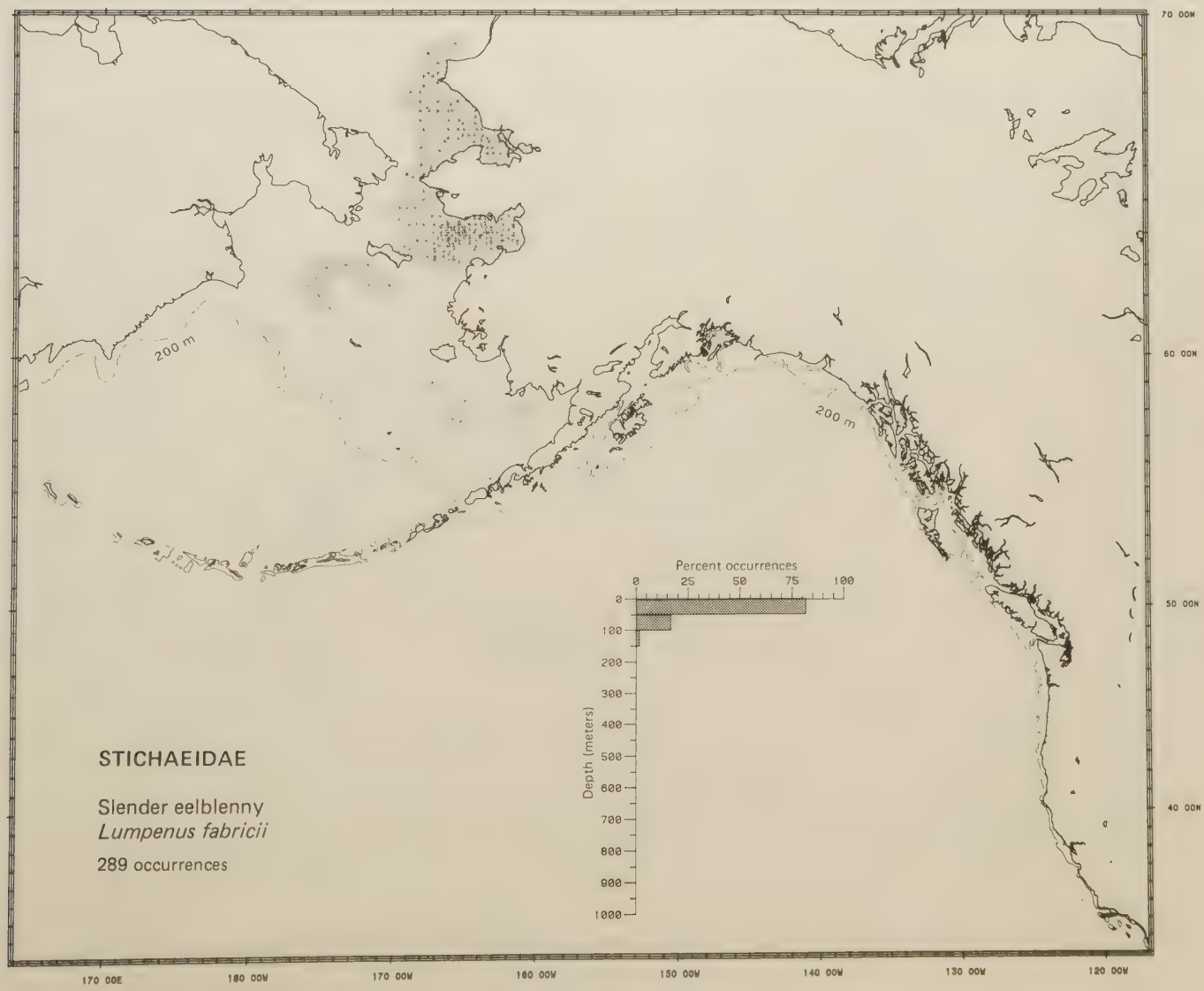
SLENDER EELBLENNY, *Lumpenus fabricii* (Valenciennes 1836 *in* Cuvier and Valenciennes)

Literature Reported from the Sea of Japan and the Sea of Okhotsk and from southeastern Alaska north to the Arctic, and along the American coast of the Arctic to western Greenland and along the Asian coast to Novaya Zemlya (Andriyashev 1954; Quast and Hall 1972; Howe 1981), at depths from the intertidal zone to 119 m (Howe 1981).

Survey data Found from north of Cape Lisburne in the Chukchi Sea south to Navarin Canyon on the northwest slope of the eastern Bering Sea and Bristol Bay. Depth range 25 to 175 m, most frequently (81.7% of occurrences) on the inner shelf at depths <50 m, and 98.3% of occurrences from depths <100 m. Survey data provide a new maximum depth record.

Conclusions

Zoogeography	Arctic-northern boreal Pacific
Life zone	Inner shelf-outer shelf (inner shelf)
Range	From the Sea of Japan and the Sea of Okhotsk and southeastern Alaska, north throughout the Arctic to western Greenland and Novaya Zemlya
Depth	Intertidal zone to 175 m



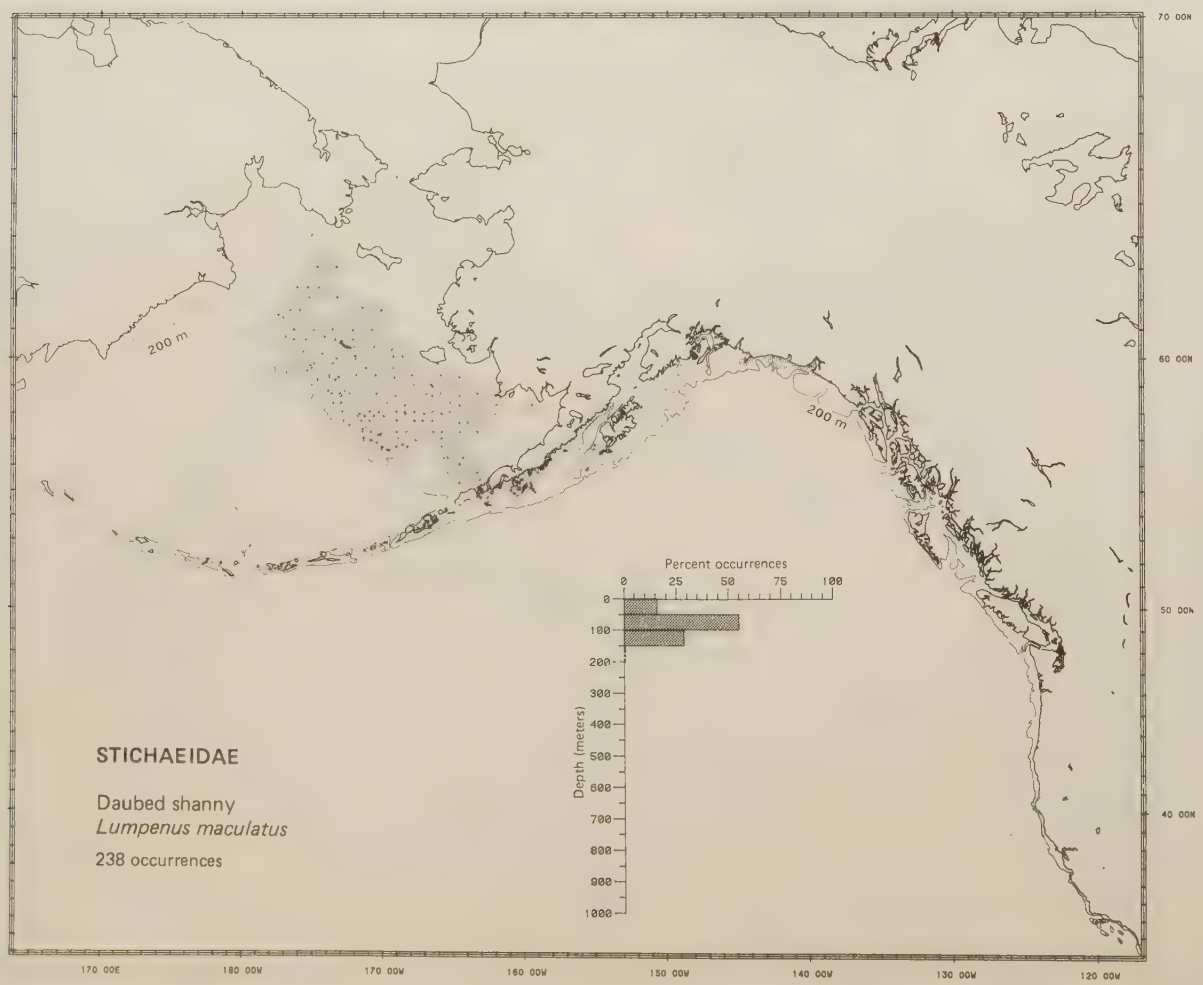
Taxonomic comment Makushok (1958), the most recent revision of the family Stichaeidae, considered the daubed shanny as *Leptoclinus maculatus*. Although J. S. Nelson (1984) recognized *Leptoclinus*, a monotypic genus, as valid, most workers currently examining the family regard *Leptoclinus* as a junior synonym of *Lumpenus* (E. M. Anderson, Dep. Ichthyol., Calif. Acad. Sci., San Francisco, CA 94118, pers. commun. February 1986).

Literature Reported in the North Pacific from the northern Sea of Japan and Sea of Okhotsk in the west to Puget Sound, Washington, Unimak Island in the Aleutian Islands, and the Alaskan Arctic in the east, and in the North Atlantic from Cape Cod, Massachusetts, north to southern Baffin Island and Greenland, Iceland, Spitsbergen, the Barents Sea, and south to the Skagerrak (Andriyashev 1954; Wilimovsky 1964; Leim and Scott 1966; Hart 1973; Wheeler 1978; Eschmeyer and Herald 1983), at depths of 15 to 400 m (Andriyashev 1954).

Survey data Found from southwest of Providence Bay on the Anadyr Gulf southeast to Bristol Bay and Unalaska Island, and east to Yakutat Bay in the Gulf of Alaska. Depth range 25 to 175 m, most frequently (55.0% of occurrences) on the middle shelf between 50 and 100 m, and 99.6% of occurrences from depths <150 m. Survey data extend the known range slightly west in the Aleutian Islands to Unalaska Island.

Conclusions

Zoogeography	Arctic-amphiboreal (circumboreal Atlantic-northern boreal Pacific)
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From the northern Sea of Japan and Sea of Okhotsk, Unalaska Island, and Puget Sound, Washington, north to the Alaskan Arctic, and in the North Atlantic from Cape Cod, Massachusetts, north to Spitsbergen, the Barents Sea, and south to the Skagerrak
Depth	15 to 400 m



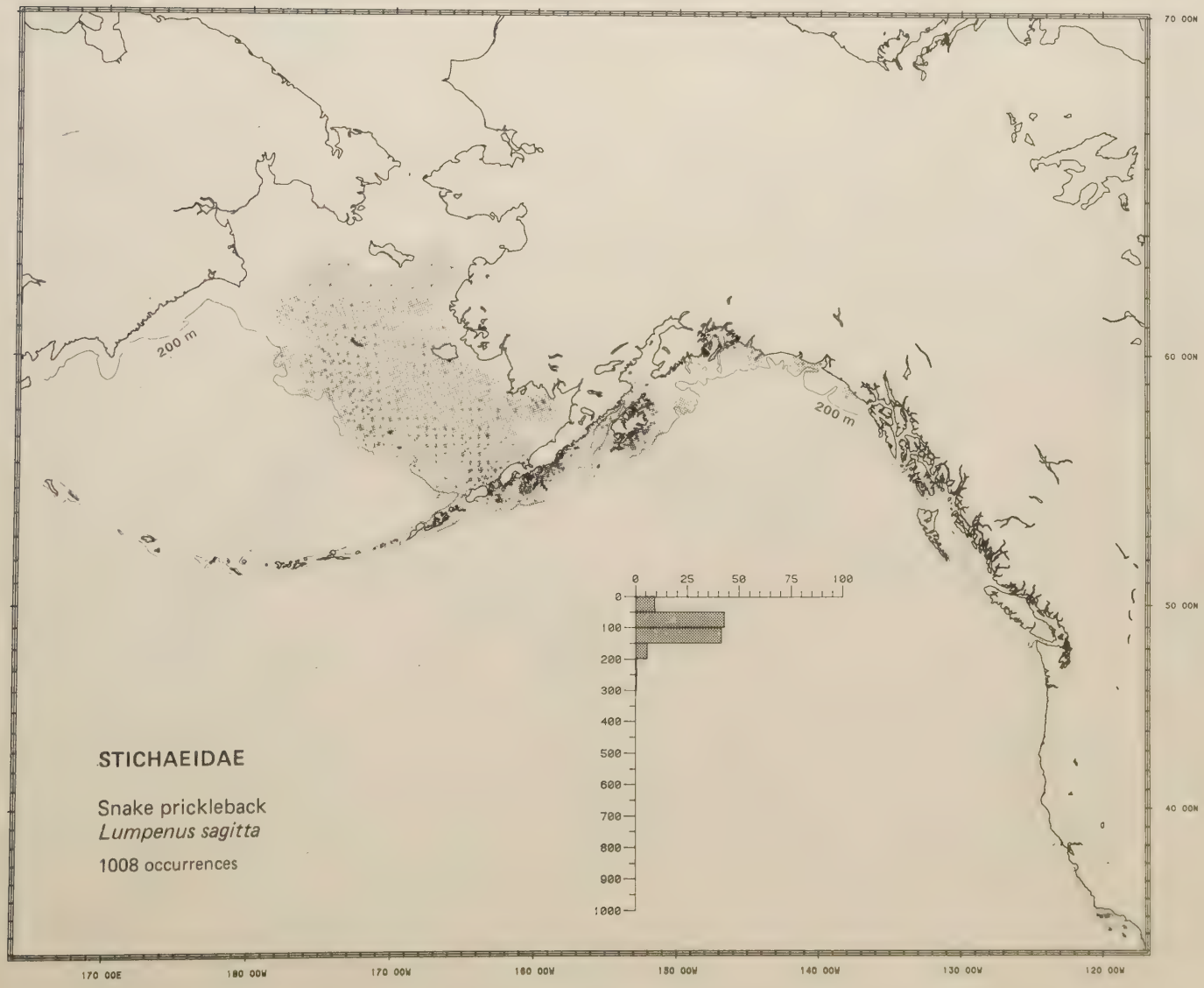
SNAKE PRICKLEBACK, *Lumpenus sagitta* Wilimovsky 1956

Literature Reported from the Sea of Japan and Sakhalin to the Bering Sea, west along the Aleutian Islands to Adak Island and southeast to San Francisco, California (Wilimovksy 1964; Okada and Kobayashi 1968; Quast and Hall 1972; Eschmeyer and Herald 1983), from "shallow depths" to 207 m (Eschmeyer and Herald 1983).

Survey data Found from Saint Lawrence Island in the Bering Sea southeast along the shelf to Unalaska Island, and east to Wrangell, Alaska. Depth range 25 to 425 m, most frequently (42.9% of occurrences) on the middle shelf between 50 and 100 m, and 98.8% of occurrences from depths ≤200 m. Survey data provide a more precise distribution of this species in the Bering Sea and expand its known depth range.

Conclusions

Zoogeography	Kurile-Aleutian
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From the Sea of Japan and Sakhalin to Saint Lawrence Island in the Bering Sea, west to Adak Island in the Aleutian Islands, and south to San Francisco, California
Depth	25 to 425 m

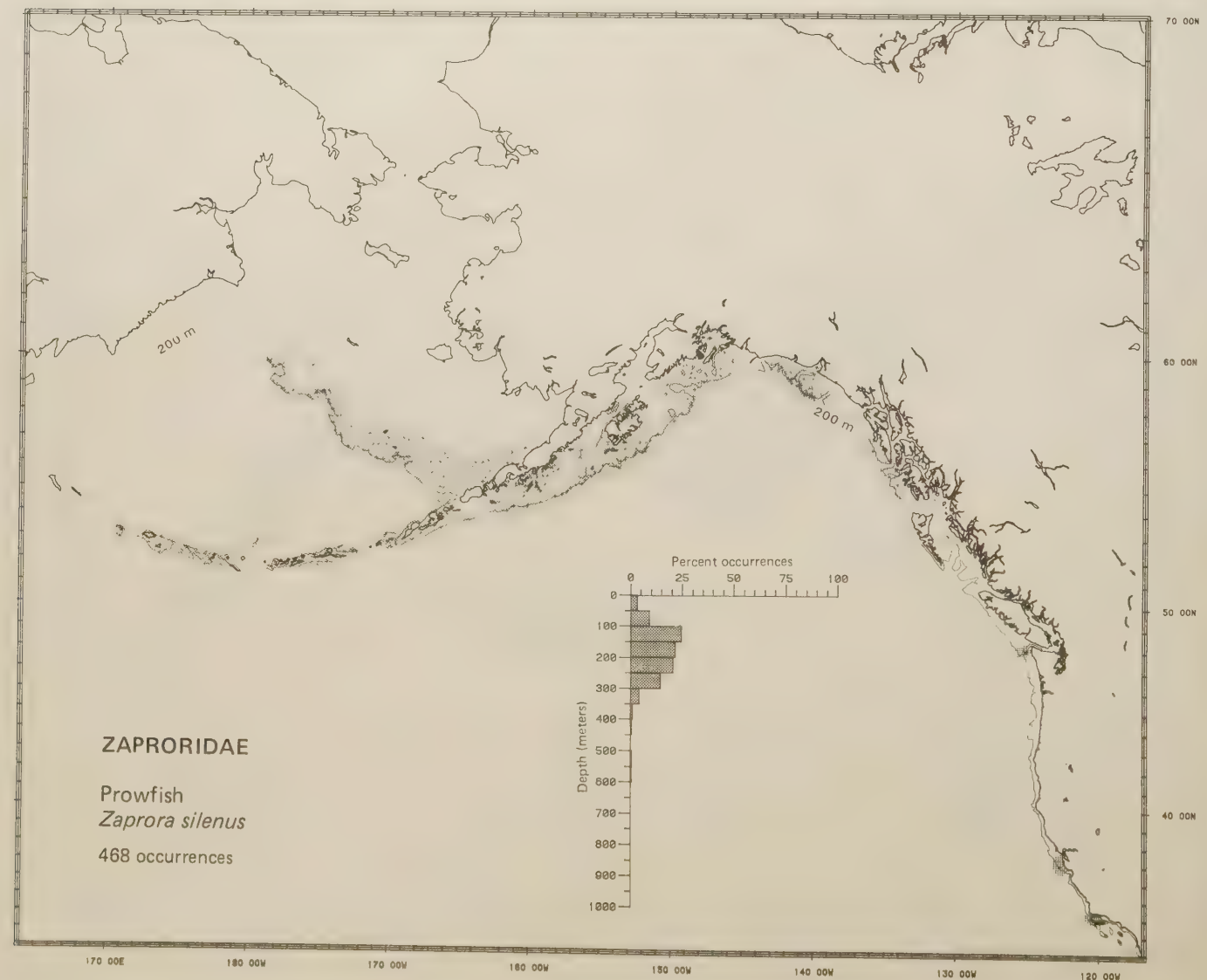


Literature Reported from Hokkaido, Japan, and western Kamchatka to the Bering Sea, west along the Aleutian Islands to Attu Island, and southeast to Monterey Bay, California (Hart 1973; Howe 1981; Eschmeyer and Herald 1983), at depths of 10 to 550 m (Shmidt 1950; Fedorov 1973a; Howe 1981).

Survey data Found from Navarin Canyon on the northwestern slope of the eastern Bering Sea southeast to Unimak Island and Port Moller (on the Alaska Peninsula), west in the Aleutian Islands to Stalemate Bank, and southeast to San Miguel Island in southern California. Depth range 25 to 675 m, most frequently (24.4% of occurrences) on the outer shelf between 100 and 150 m, and 97.0% of occurrences from depths ≤350 m. Survey data provide a more precise distribution of this species in the Bering Sea, extend its known range south to San Miguel Island, California, and provide a new maximum depth record.

Conclusions

Zoogeography	Northeastern boreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From Hokkaido, Japan, and western Kamchatka to Navarin Canyon in the Bering Sea, west in the Aleutian Islands to Attu Island, and southeast to San Miguel Island, California
Depth	10 to 675 m

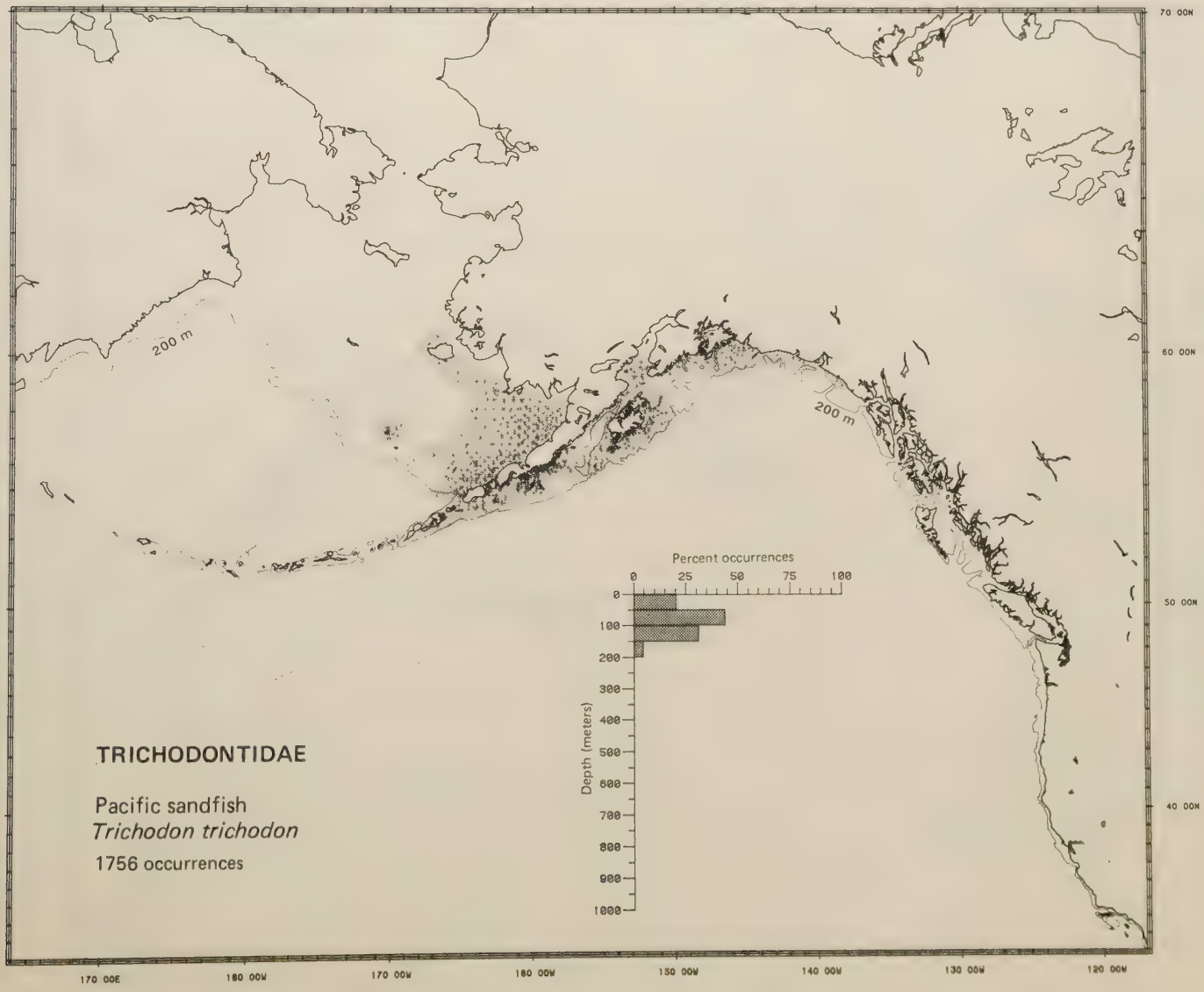


Literature Reported from the southeastern Bering Sea, west in the Commander-Aleutian Islands to Medny Island and southeast to San Francisco, California (Wilimovsky 1964; Hart 1973; Eschmeyer and Herald 1983), from "inshore regions" to 250 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from offshore of Nunivak Island and Saint Paul Island in the southeastern Bering Sea east throughout Bristol Bay, west in the Aleutian Islands to Unalaska Island, and east to Cape Fairweather in southeast Alaska. Depth range 25 to 375 m, most frequently (43.8% of occurrences) on the middle shelf between 50 and 100 m, and 95.0% of occurrences from depths <150 m. Survey data provide a more precise range of this species in the Bering Sea and expand its known depth distribution.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Nunivak Island in the Bering Sea, west in the Commander-Aleutian Islands to Medny Island, and southeast to San Francisco, California
Depth	20 to 375 m

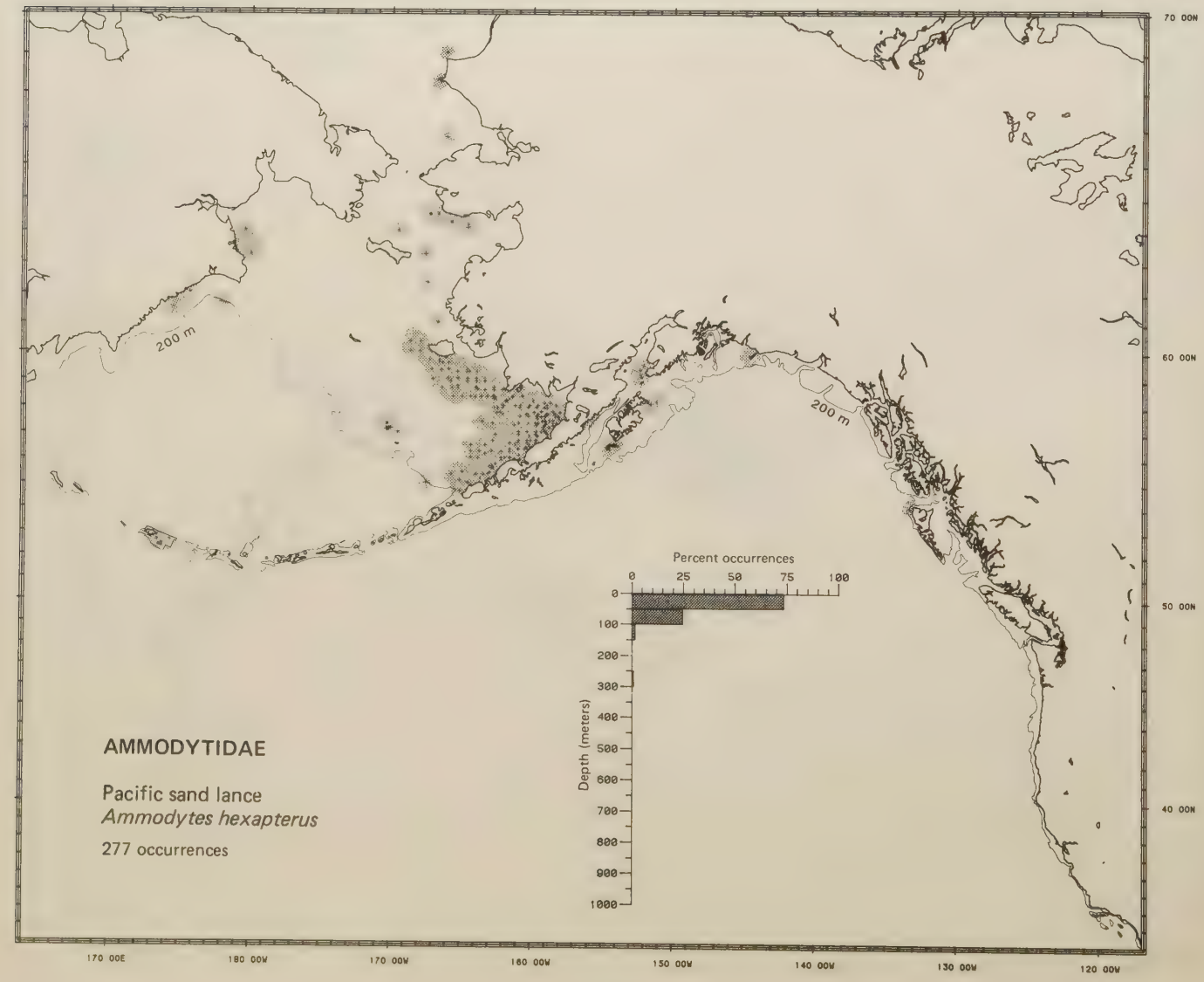


Literature Reported from the northern Sea of Japan and the Sea of Okhotsk north to the Canadian Arctic, throughout the Bering Sea, west in the Aleutian Islands to Attu Island, and south to Balboa Island in southern California (Wilimovsky 1964; Hart 1973; Eschmeyer and Herald 1983), at depths from the intertidal zone to 100 m (Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from offshore of Cape Nizkiy (on the Korak Coast of the western Bering Sea) north to Cape Lisburne in the Chukchi Sea, southeast in the Bering Sea to Bristol Bay and Unimak Island, west in the Aleutian Islands to Attu Island, and east to the north end of Graham Island, British Columbia. Depth range 25 to 275 m, most frequently (73.3% of occurrences) on the inner shelf at depths <50 m, and 97.8% of occurrences from depths <100 m. Survey data provide a new maximum depth record; however, because this species can occur pelagically, it may have been taken near the surface but recorded at a greater depth.

Conclusions

Zoogeography	Arctic-northeastern Pacific
Life zone	Inner shelf-middle shelf (inner shelf)
Range	From the northern Sea of Japan and Sea of Okhotsk, Attu Island in the Aleutian Islands, and Balboa Island, California, north to the Canadian Arctic
Depth	Intertidal zone to 100 m, possibly to 275 m



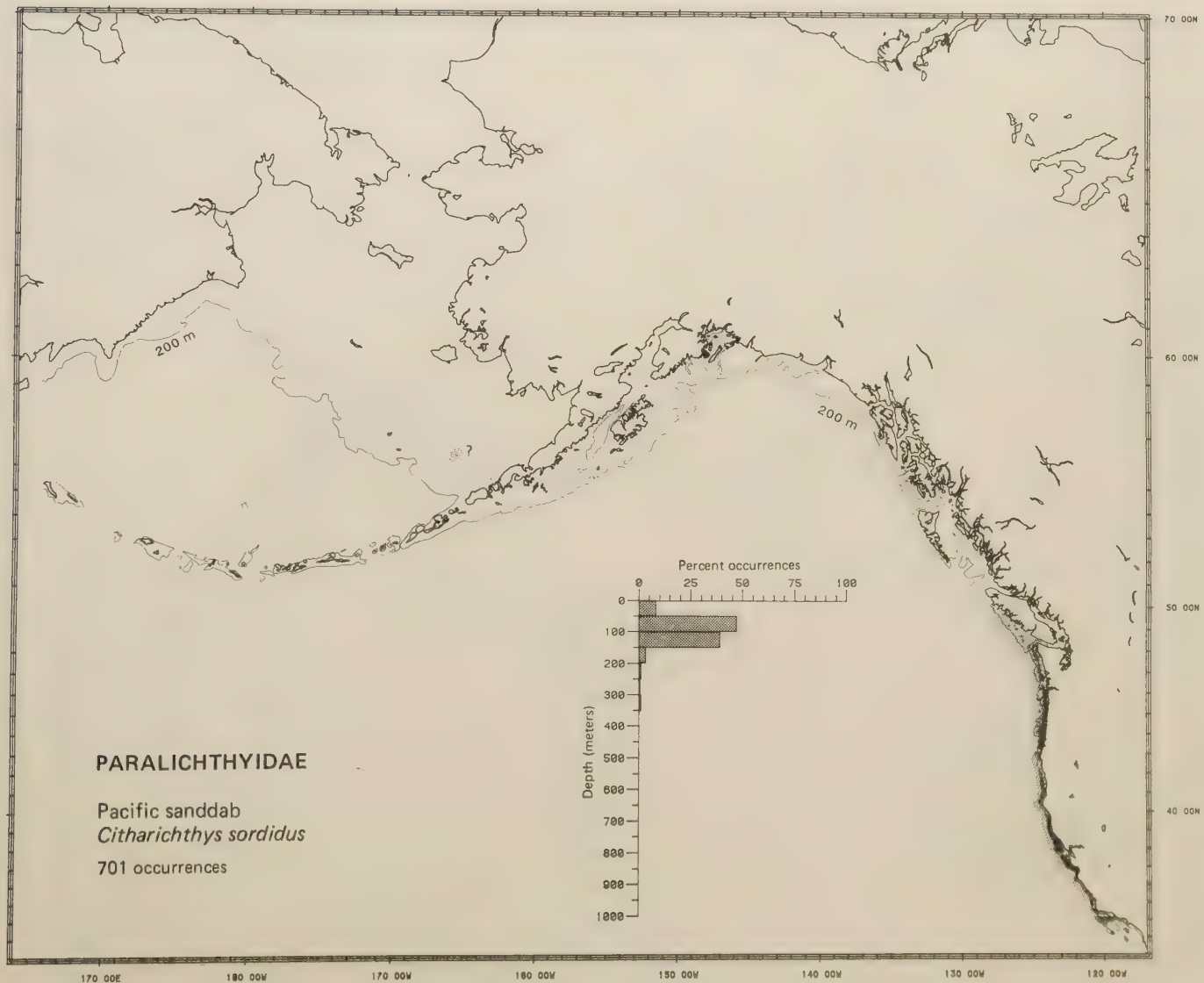
PACIFIC SANDDAB, *Citharichthys sordidus* (Girard 1854)

Literature Reported from Kiska Island in the Aleutian Islands and the Bering Sea to Cape San Lucas, Baja California Sur (Wilimovsky 1964; Miller and Lea 1972), at depths of 0 to 549 m (Howe 1981; Eschmeyer and Herald 1983).

Survey data Found from Cape Edgecumbe in southeast Alaska to Los Angeles, California, with one anomalous record from the southeastern Bering Sea. Depth range 25 to 425 m, most commonly (46.9% of occurrences) on the middle shelf between 50 and 100 m, and 93.7% of occurrences from depths ⩽150 m. Survey data were all within the known geographic range and known depth range.

Conclusions

Zoogeography	Oregonian-San Diegan
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Kiska Island in the Aleutian Islands and the southeastern Bering Sea to Cape San Lucas, Baja California Sur
Depth	0 to 549 m

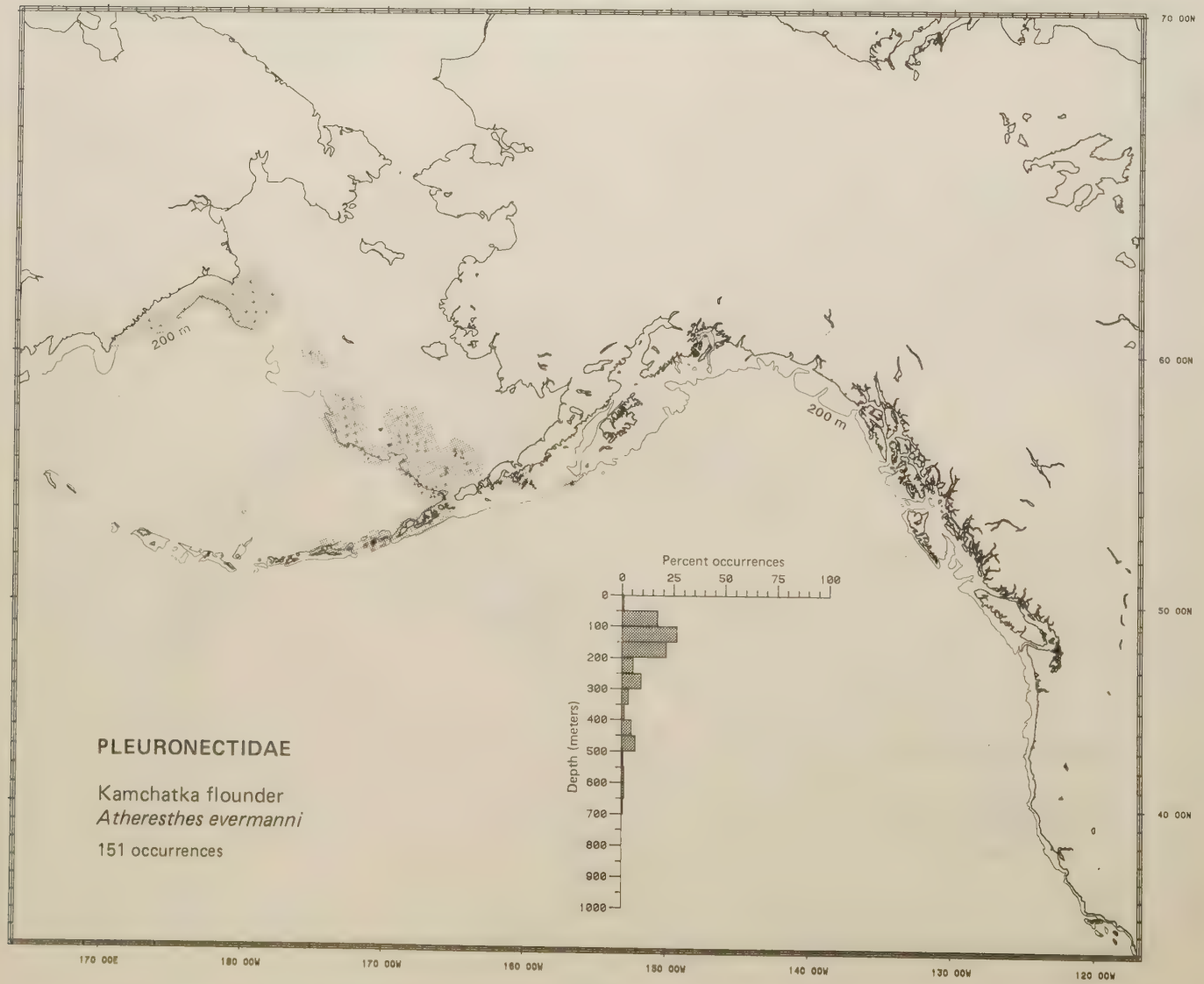


Literature Reported from the Sea of Japan and Sea of Okhotsk north to the Anadyr Gulf, southeast in the Bering Sea to the Alaska Peninsula, west throughout the Aleutian Islands, and east to Shelikof Strait in the Gulf of Alaska (Shuntov 1965; Quast and Hall 1972; Hart 1973), at depths of 33 to 1100 m (Fedorov 1973a).

Survey data Found from northeast of Cape Olyutorski north to Cape Navarin in the western Bering Sea, south along the outer shelf of the eastern Bering Sea to Unimak Pass, west along the Aleutian Islands to Atka Island, and east to south Shelikof Strait in the northwestern Gulf of Alaska. Depth range 25 to 675 m in depth, most frequently (26.5% of occurrences) on the outer shelf from 100 to 150 m, and 95.3% of occurrences from 50 to 500 m. Survey data provide a slightly shallower minimum depth record. Over much of the eastern range of Kamchatka flounder, the species may have been misidentified as arrowtooth flounder, *Atheresthes stomias* (Ranck et al. 1986).

Conclusions

Zoogeography	Northern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From the Sea of Japan and Sea of Okhotsk north to the Anadyr Gulf, through the eastern Bering Sea to Unimak Pass, west in the Aleutian Islands to Atka Island, and east to Shelikof Strait in the northwestern Gulf of Alaska
Depth	25 to 1100 m



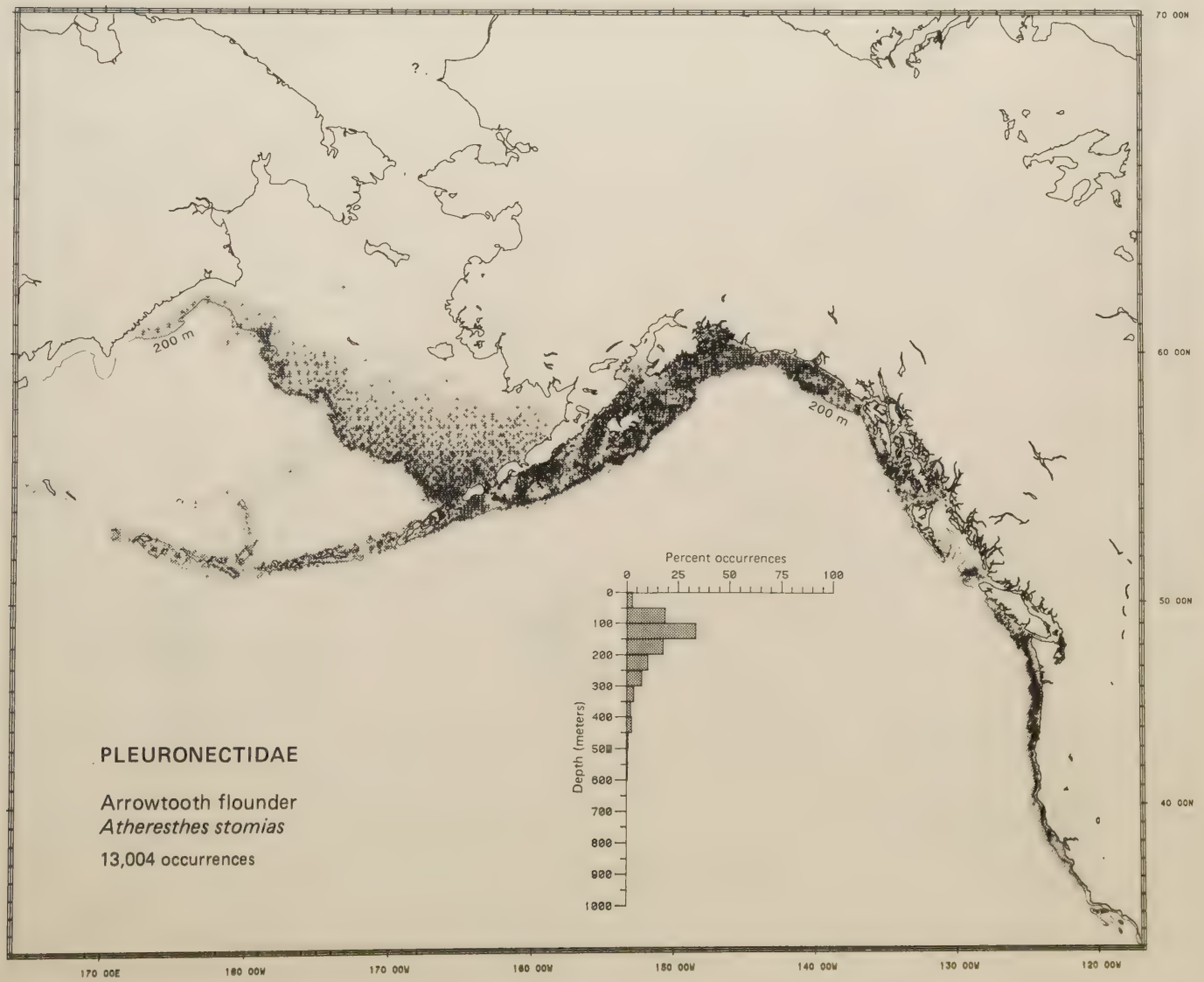
ARROWTOOTH FLOUNDER, *Atheresthes stomias* (Jordan and Gilbert 1880)

Literature Reported from the Bering Sea (and questionably, the Chukchi Sea) and Attu Island in the Aleutian Islands to San Pedro, California, from 18 to 900 m in depth (Wilimovsky 1964; Miller and Lea 1972; Webber and Sample 1976; Eschmeyer and Herald 1983).

Survey data Found from off Glubokaya Bay (northeast of Cape Olyutorski) in the western Bering Sea north to southwest of Saint Lawrence Island, south along the outer shelf of the eastern Bering Sea, west along the Aleutian Islands to Bowers Bank and Stalemate Bank, and from there southeast to San Simeon, California. One record from west of Point Hope in the Chukchi Sea was probably a misidentification. Found at depths of 25 to 875 m, most frequently (33.5% of occurrences) on the outer shelf between 100 to 150 m, and 95.2% of occurrences from depths ≤400 m. Survey data define the northern and western limits in the Bering Sea. However, the Kamchatka flounder, *Atheresthes evermanni*, may have been confused with this species in some regions such as the northern Bering Sea and Aleutian Islands (Ranck et al. 1986). The San Pedro, California, record for this species given in Miller and Lea (1972) is a mistakenly identified slender sole, *Eopsetta exilis*.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From off Glubokaya Bay in the western Bering Sea and Stalemate Bank in the Aleutian Islands to San Simeon, California
Depth	18 to 900 m



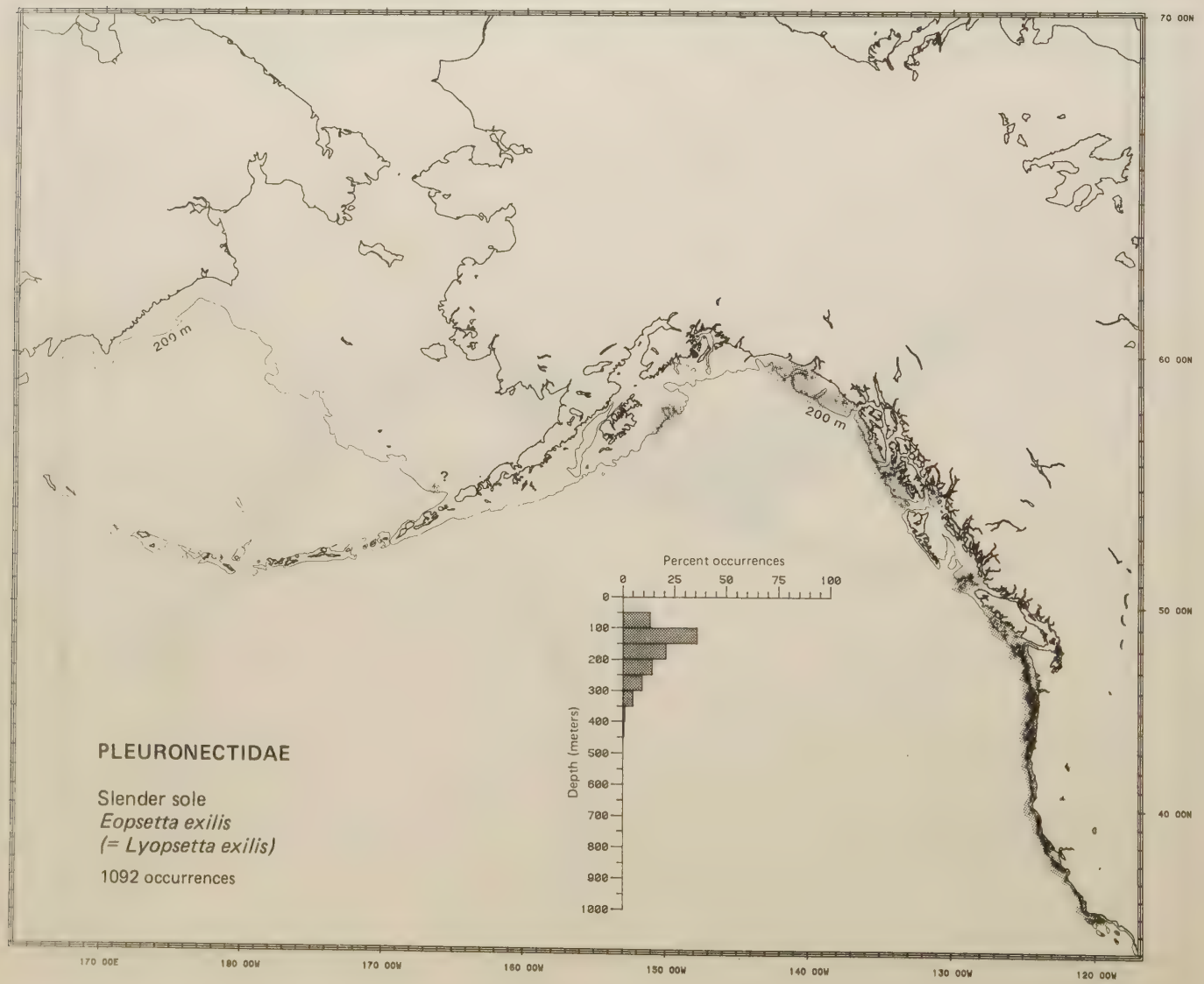
Taxonomic comment The slender sole is *Lyopsetta exilis* in Robins (1980), but Sakamoto (1984), the most recent revision of the family Pleuronectidae, placed the species in the genus *Eopsetta*.

Literature Reported from Alsek Canyon off southeastern Alaska to Cedros Island, Baja California (Miller and Lea 1972), and from 50 to 800 m in depth (Howe 1981; Allen 1982).

Survey data Found from North Albatross Bank (east of Kodiak Island) to Oxnard, California; one record from north of Akutan Island in the Bering Sea is anomalous. Depth range from 25 to 475 m, found most frequently (35.6% of occurrences) on the outer shelf between 100 and 150 m, and 98.1% of occurrences were from 50 to 350 m. Survey data extend the western range limit to North Albatross Bank and provide a new minimum known depth.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From North Albatross Bank, Alaska, to Cedros Island, Baja California
Depth	25 to 800 m



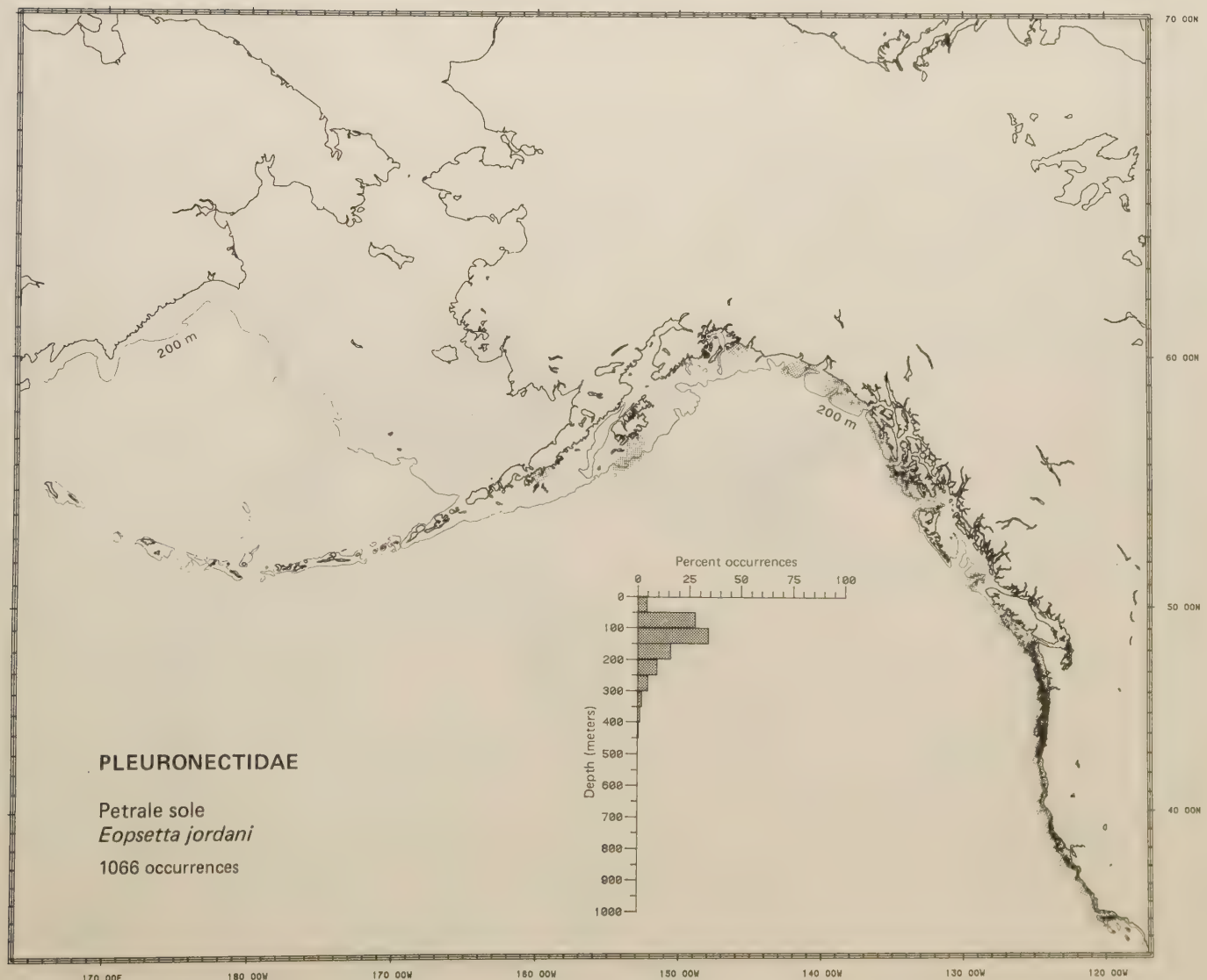
PETRALE SOLE, *Eopsetta jordani* (Lockington 1879)

Literature Reported from the Bering Sea to the Coronado Islands, Baja California (Miller and Lea 1972; Eschmeyer and Herald 1983), ranging in depth from 0 to 550 m (Hart 1973).

Survey data Found from Kupreanof Point on the Alaska Peninsula to Oxnard, California. Depth range 25 to 475 m, most frequently (33.9% of occurrences) on the outer shelf between 100 and 150 m, and 96.2% of occurrences from depths ≤300 m. Survey data were all within the known geographic range and known depth range.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From the Bering Sea to the Coronado Islands, Baja California
Depth	0 to 550 m



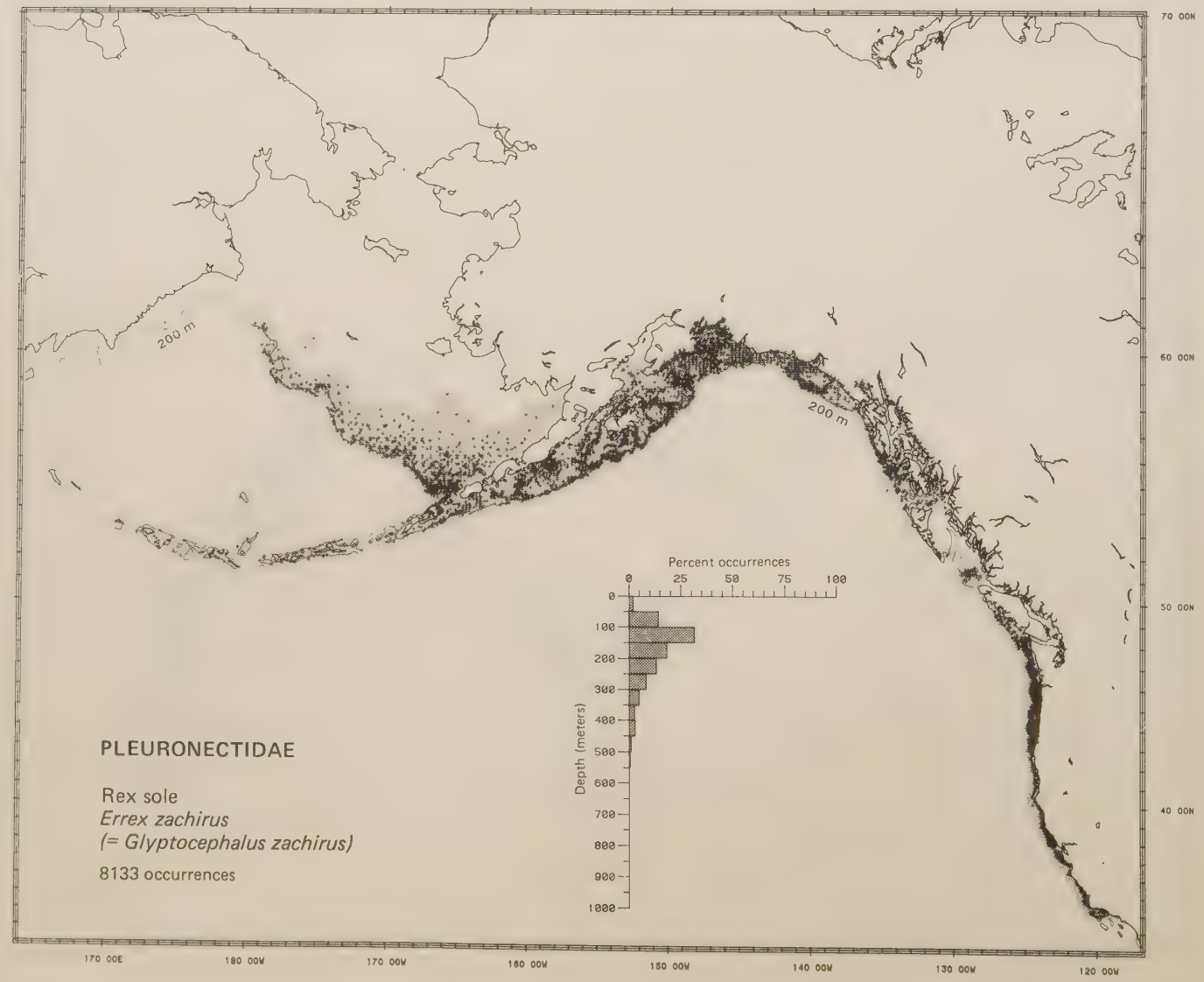
Taxonomic comment The rex sole is *Glyptocephalus zachirus* in Robins (1980), but Sakamoto (1984), the most recent revision of the family Pleuronectidae, places the species in the genus *Errex*.

Literature Reported from the eastern Bering Sea and Amchitka Island in the Aleutian Islands to Cedros Island, Baja California (Miller and Lea 1972; Hart 1973; Simenstad et al. 1977), and at depths of 0 to 850 m (Hart 1973; Fedorov 1973a).

Survey data Found off Glubokaya Bay in the western Bering Sea and along the outer shelf of the eastern Bering Sea from Navarin Canyon in the north to eastern Bristol Bay, in the Aleutian Islands from Stalemate Bank and Bowers Bank, through the Gulf of Alaska to Santa Barbara, California. Depth range 25 to 525 m, most commonly (31.6% of occurrences) on the outer shelf between 100 and 150 m, and 95.9% of occurrences from depths of 50 to 450 m. Survey data extend the known range to the western Bering Sea and Aleutian Islands, and provide a more detailed distribution in the eastern Bering Sea.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Middle shelf-mesobenthal (outer shelf)
Range	From off Glubokaya Bay in the western Bering Sea and Stalemate Bank in the Aleutian Islands to Cedros Island, Baja California
Depth	0 to 850 m

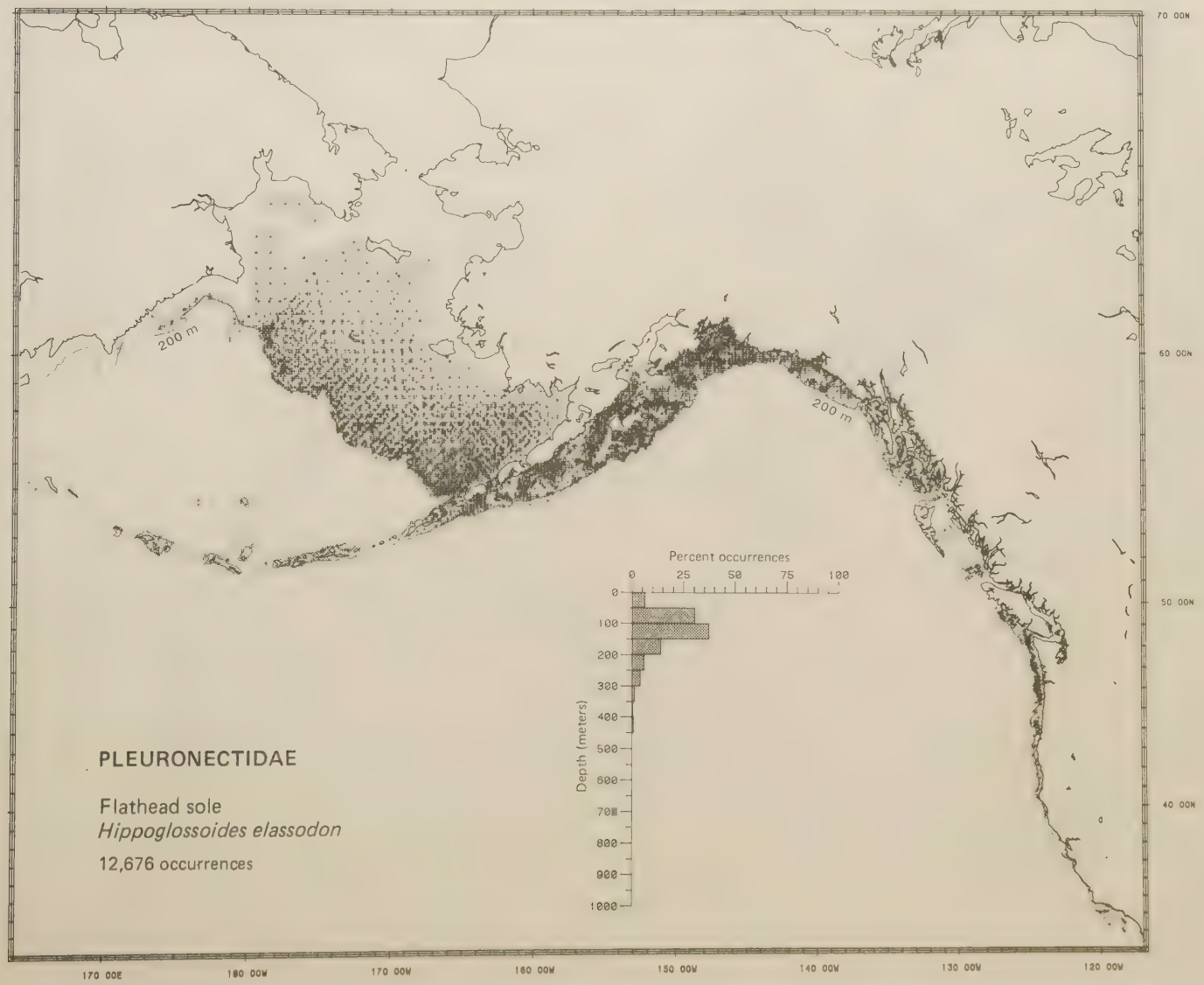


Literature Reported from the northern Kurile Islands and western Kamchatka to the Korak Coast of the western Bering Sea, from there south to the Alaska Peninsula, west in the Aleutian Islands to Amchitka Island, and southeast to Point Reyes, California (Simenstad et al. 1977; Fadeev 1978). Reports of this species in the Chukchi Sea (Quast and Hall 1972) are probably of the Bering flounder, *Hippoglossoides robustus*, rather than of the flathead sole (Fadeev 1978). Reports of this species from the Sea of Japan (Quast and Hall 1972) are probably of the red flounder, *Hippoglossoides dubius* Schmidt 1904, which is regarded as a species rather than as a subspecies of the flathead sole by Fadeev (1978) and Sakamoto (1984). Reported from 0 to 1050 m (Hart 1973; Fedorov 1973a).

Survey data Found from Cape Olyutorski in the western Bering Sea, north to the Anadyr Gulf and Saint Lawrence Island, and south throughout the middle and outer shelf of the eastern Bering Sea; in the Aleutian Islands, as far west as Stalemate and Bowers Banks and west of Bering Island in the Commander Islands; from the Aleutians, southeast to Monterey, California. Depth range 25 to 875 m, most frequently (37.1% of occurrences) on the outer shelf between 100 and 150 m, and 93.3% of occurrences from depths <250 m. Survey data extend the southern and Aleutian Island limits.

Conclusions

Zoogeography	Kurile-Aleutian
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From the northern Kurile Islands to the Anadyr Gulf, southeast in the Bering Sea, west in the Aleutian Islands to Stalemate Bank, and southeast to Monterey, California
Depth	0 to 1050 m



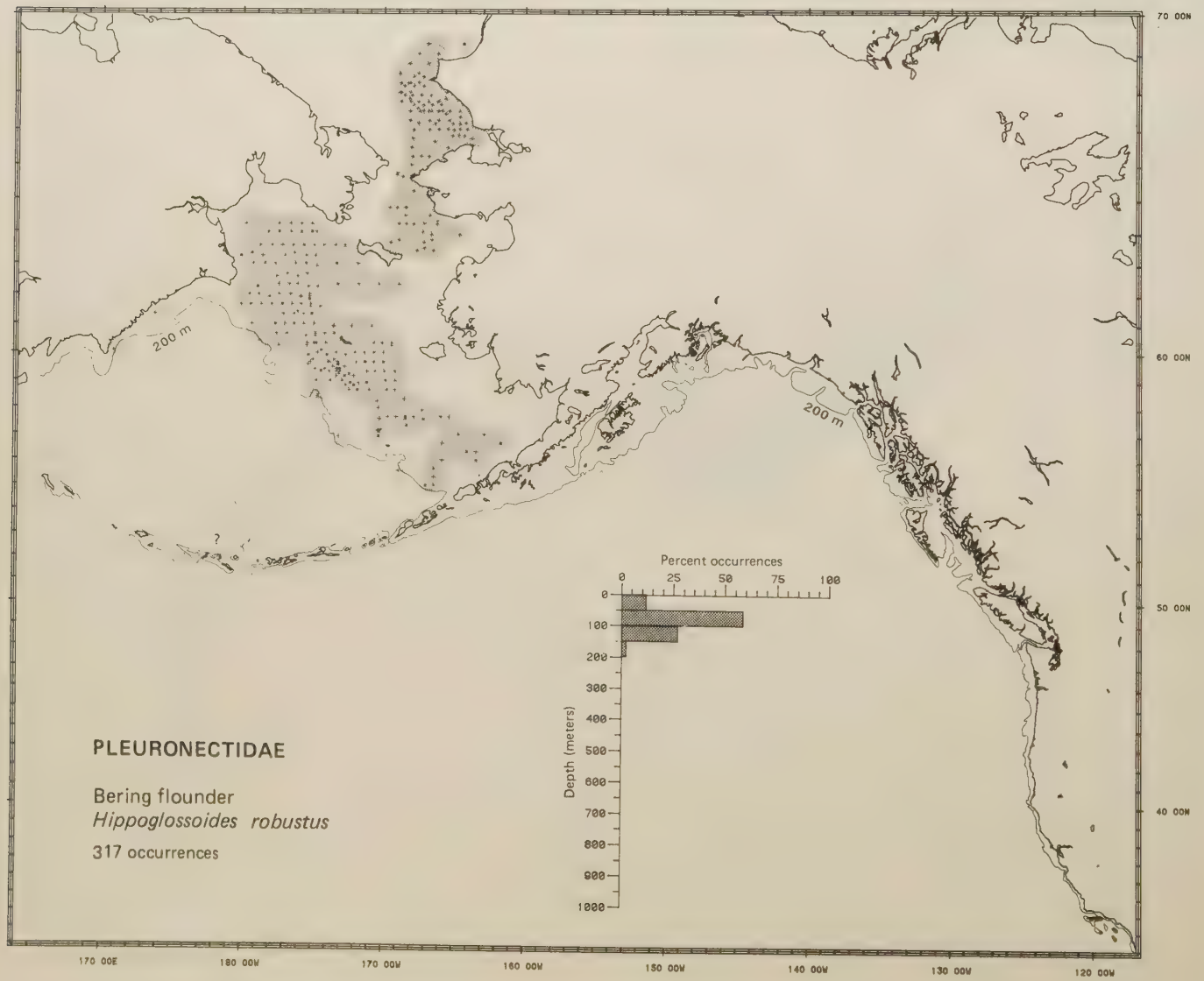
Taxonomic comment Fadeev (1978) considered the Bering flounder to be a subspecies of the flathead sole, *Hippoglossoides elassodon*. However, F. M. Utter (Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Seattle, WA 98112, pers. commun. February 1986), based on genetic evidence from Bering Sea populations, and Sakamoto (1984) considered the Bering flounder to be a valid species.

Literature Reported from Hokkaido, Japan, the Tatar Strait, and the Sea of Okhotsk to the Aleutian Islands, Chukchi Sea, and southeastern Bering Sea (Andriyashev 1954; Quast and Hall 1972; Hart 1973; Howe 1981), and in depth from 18 to 293 m (Fedorov 1973a).

Survey data Found from Cape Olyutorski in the western Bering Sea north to northeast of Cape Lisburne in the Chukchi Sea and south along the middle shelf of the eastern Bering Sea to northwest of Akutan Island. One anomalous record was reported from Little Sitkin Island in the Aleutian Islands. Depth range 25 to 425 m, most frequently (58.5% of occurrences) on the middle shelf between 50 and 100 m, and 96.8% of occurrences from depths ⩽150 m. Survey data were all within the known geographic range, but give a more precise distribution in the north and east, and extend the known depth range into deeper water. The flathead sole, *Hippoglossoides elassodon*, may have been confused with this species in the southeastern Bering Sea.

Conclusions

Zoogeography	Arctic-Okhotsk
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Hokkaido, Japan, and the Sea of Okhotsk north to northeast of Cape Lisburne, south in the Bering Sea to northwest of Akutan Island, and possibly west to Little Sitkin Island in the Aleutians
Depth	18 to 425 m



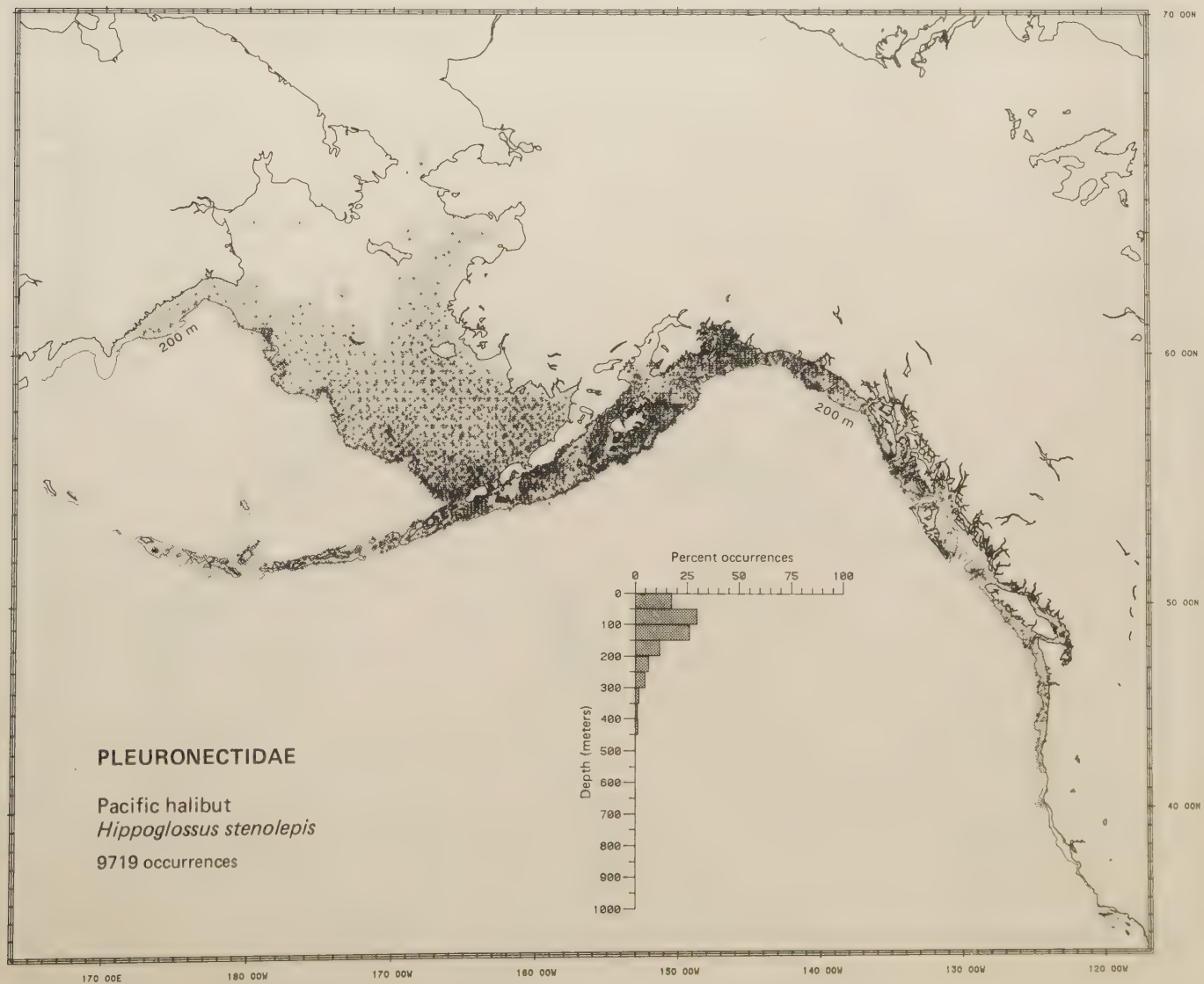
PACIFIC HALIBUT, *Hippoglossus stenolepis* Schmidt 1904

Literature Reported from the Sea of Japan off Hokkaido and the Sea of Okhotsk to the southern Anadyr Gulf and Norton Sound in the Bering Sea, west in the Aleutian Islands to Attu Island, and southeast to Point Camalu, Baja California (Andriyashev 1954; Wilimovsky 1964; Hart 1973; R. H. Rosenblatt, Scripps Inst. Oceanogr., Univ. Calif. San Diego, La Jolla, CA 92093, pers. commun. August 1984, Fish. collection no. SIO-84-1). Depth range from 6 to 1097 m (Miller and Lea 1972; Eschmeyer and Herald 1983).

Survey data Found from Medny Seamount and Cape Olyutorski in the western Bering Sea north to the southern Chukchi Sea, throughout the shelf of the eastern Bering Sea, and west along the Aleutian Islands to Agattu Island and Bowers Bank; from the Aleutian Islands, south to Cape Mendocino, California. Depth range 25 to 875 m, most frequently (29.6% of occurrences) on the middle shelf from 50 to 100 m, and 95.5% of occurrences from depths <300 m. Survey data extend the northern limit of the known range.

Conclusions

Zoogeography	Arctic-northeastern boreal Pacific
Life zone	Inner shelf-mesobenthal (middle shelf)
Range	From Hokkaido, Japan, and the Sea of Okhotsk to the southern Chukchi Sea, southeast in the Bering Sea, west along the Aleutian Islands to Attu Island and southeast to Point Camalu, Baja California
Depth	6 to 1097 m

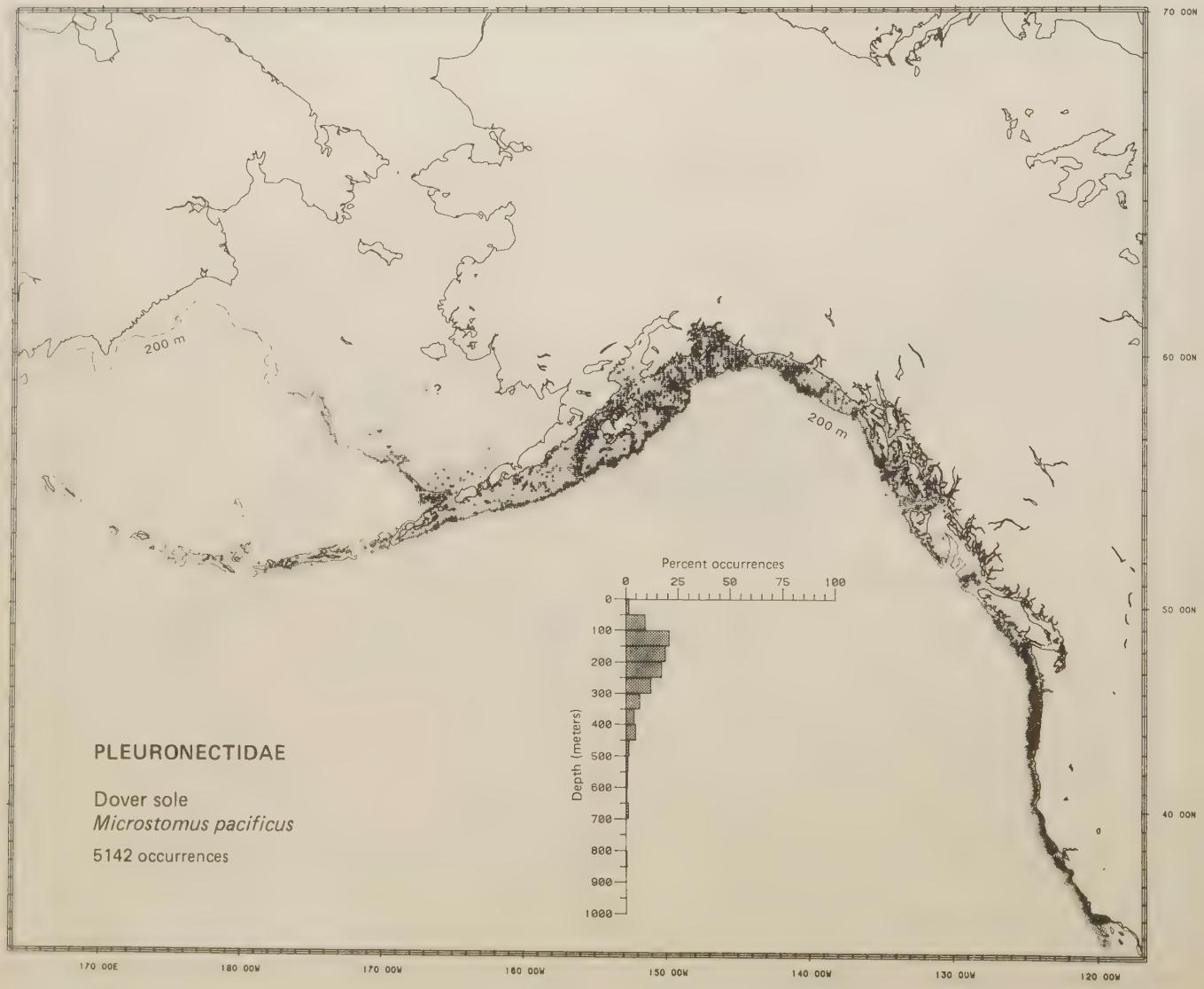


Literature Reported from the Bering Sea and in the Aleutian Islands, to San Cristobal Bay, Baja California Sur (Wilimovsky 1964; Miller and Lea 1972), at depths of 10 to 1189 m (Allen and Mearns 1976; Allen 1982).

Survey data Found along the outer shelf of the eastern Bering Sea from Navarin Canyon to south Bristol Bay, west along the Aleutian Islands to Stalemate Bank, and southeast to San Clemente Island, California. One questionable record occurred just south of Nunivak Island. Depth range 25 to 1025 m, most frequently (20.7% of occurrences) on the outer shelf between 100 and 150 m, and 95.8% of occurrences from depths <500 m. Survey data provide a more detailed distribution in the Bering Sea, and extend the known range west in the Aleutian Islands.

Conclusions

Zoogeography	Eastern boreal Pacific-San Diegan
Life zone	Inner shelf-mesobenthal (outer shelf)
Range	From Navarin Canyon in the Bering Sea west to Stalemate Bank in the Aleutian Islands, and south to San Cristobal Bay, Baja California Sur
Depth	10 to 1189 m



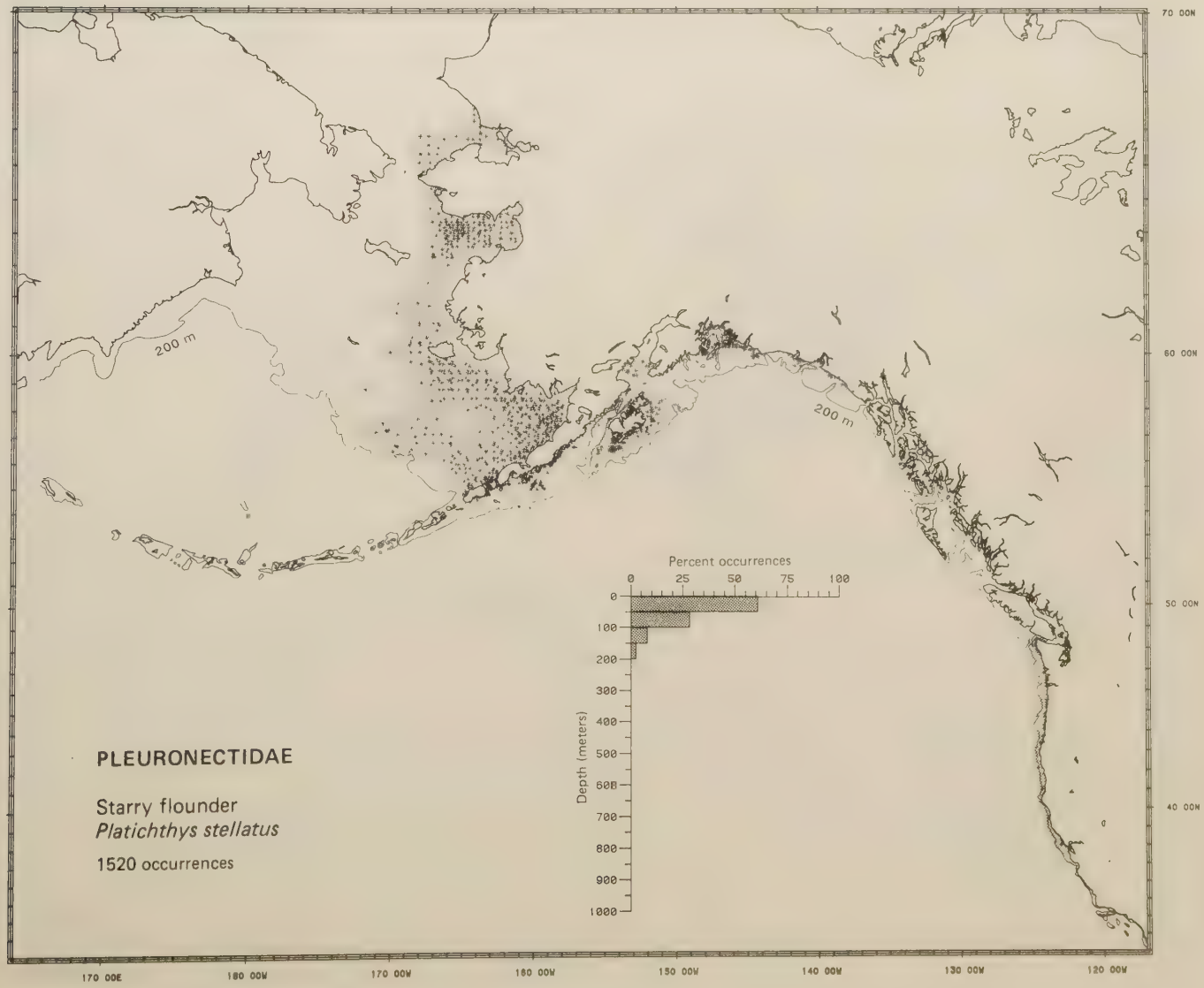
STARRY FLOUNDER, *Platichthys stellatus* (Pallas 1787)

Literature Reported from Korea and the Sea of Okhotsk north to Bathurst Inlet in the Canadian Arctic, south in the Bering Sea, west to Attu Island in the Aleutian Islands, and southeast to Los Angeles Harbor, California (Wilimovsky 1964; Quast and Hall 1972; Hart 1973; Lee et al. 1980; Horn and Allen 1981). Found 120 km up rivers to depths of 300 m on the slope (Fedorov 1973a; Lee et al. 1980; Morrow 1980).

Survey data Found from the Chukchi Sea (southeast of Kivalina, Alaska), along the inner shelf of the eastern Bering Sea to Unimak Island and south to Point Reyes, California. Depth range 25 to 375 m, most frequently (60.9% of occurrences) on the inner shelf at depths <50 m, and 97.0% of occurrences from depths <150 m. Survey data were all within the known geographic range. However, the survey maximum depth of 375 m is a new record.

Conclusions

Zoogeography	Arctic-circumboreal Pacific
Life zone	Estuarine-sublittoral (inner shelf)
Range	From Korea, Attu Island in the Aleutian Islands, and Los Angeles Harbor, California, north to Bathurst Inlet in the Canadian Arctic
Depth	0 to 375 m



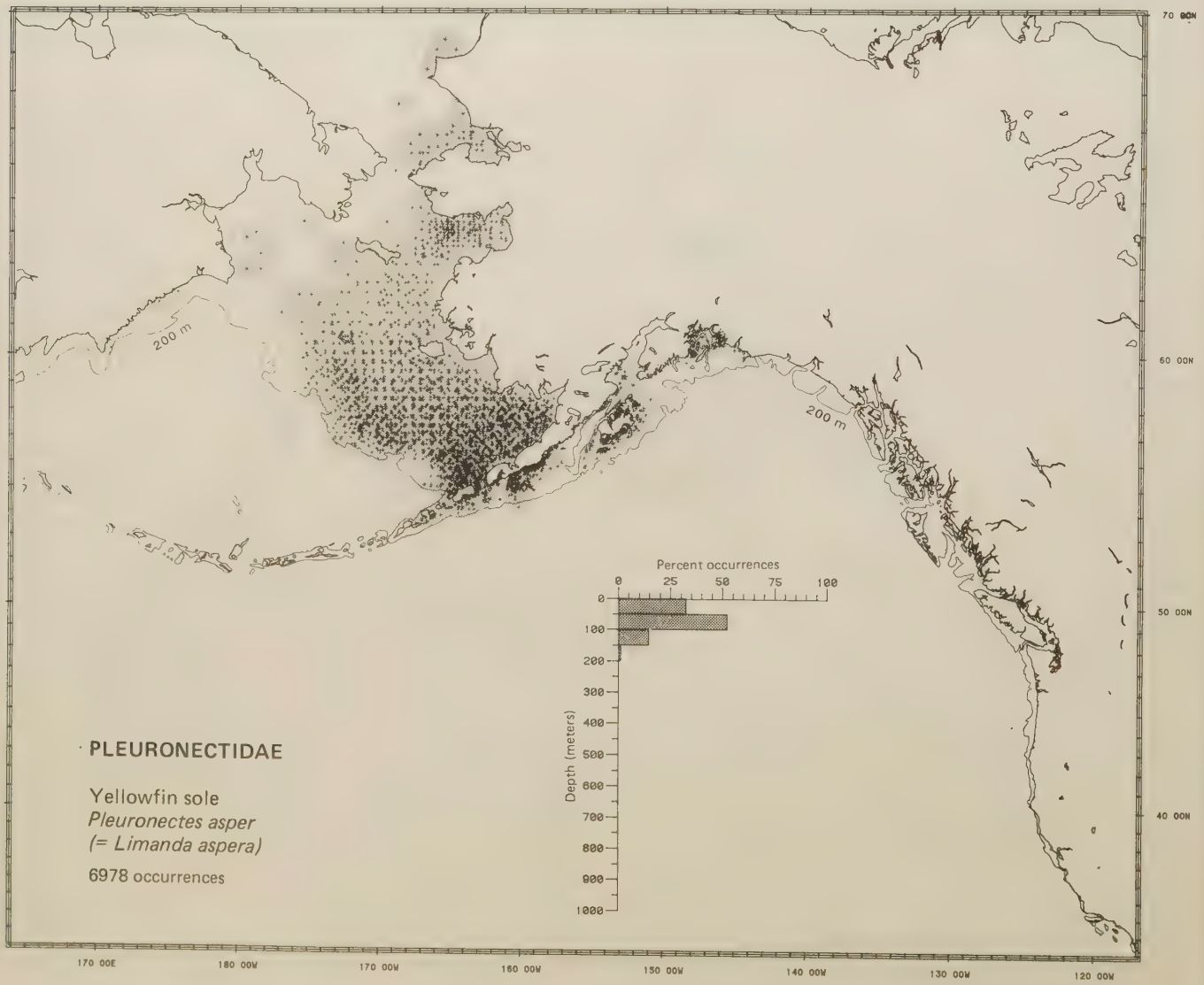
Taxonomic comment The yellowfin sole is *Limanda aspera* in Robins (1980), but Sakamoto (1984), the most recent revision of the family Pleuronectidae, placed the species in the genus *Pleuronectes*.

Literature Reported from Korea and the Sea of Okhotsk to the Chukchi Sea, southeast in the Bering Sea, west in the Aleutian Islands to Atka Island, and south to Barkley Sound in southwest Vancouver Island (Andriyashev 1954; Quast and Hall 1972; Hart 1973; Howe 1981; Eschmeyer and Herald 1983) at depths of 10 to 600 m (Fedorov 1973a).

Survey data Found from Bering Island and Cape Olyutorski in the western Bering Sea north to northeast of Cape Lisburne in the Chukchi Sea, south throughout the shelf of the eastern Bering Sea, and along the Aleutian Islands to Unalaska Island, from the Aleutian Islands eastward to Kayak Island in the northeastern Gulf of Alaska. Depth range 25 to 475 m, most commonly (52.1% of occurrences) on the middle shelf between 50 and 100 m, and 98.7% of occurrences from depths ≤150 m. Survey data were all within the known geographic range, although they better define the northern limits.

Conclusions

Zoogeography	Arctic-northwestern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Korea and the Sea of Okhotsk to northeast of Cape Lisburne in the Chukchi Sea, along the Aleutian Islands to Atka Island, and south to Barkley Sound, British Columbia
Depth	10 to 600 m



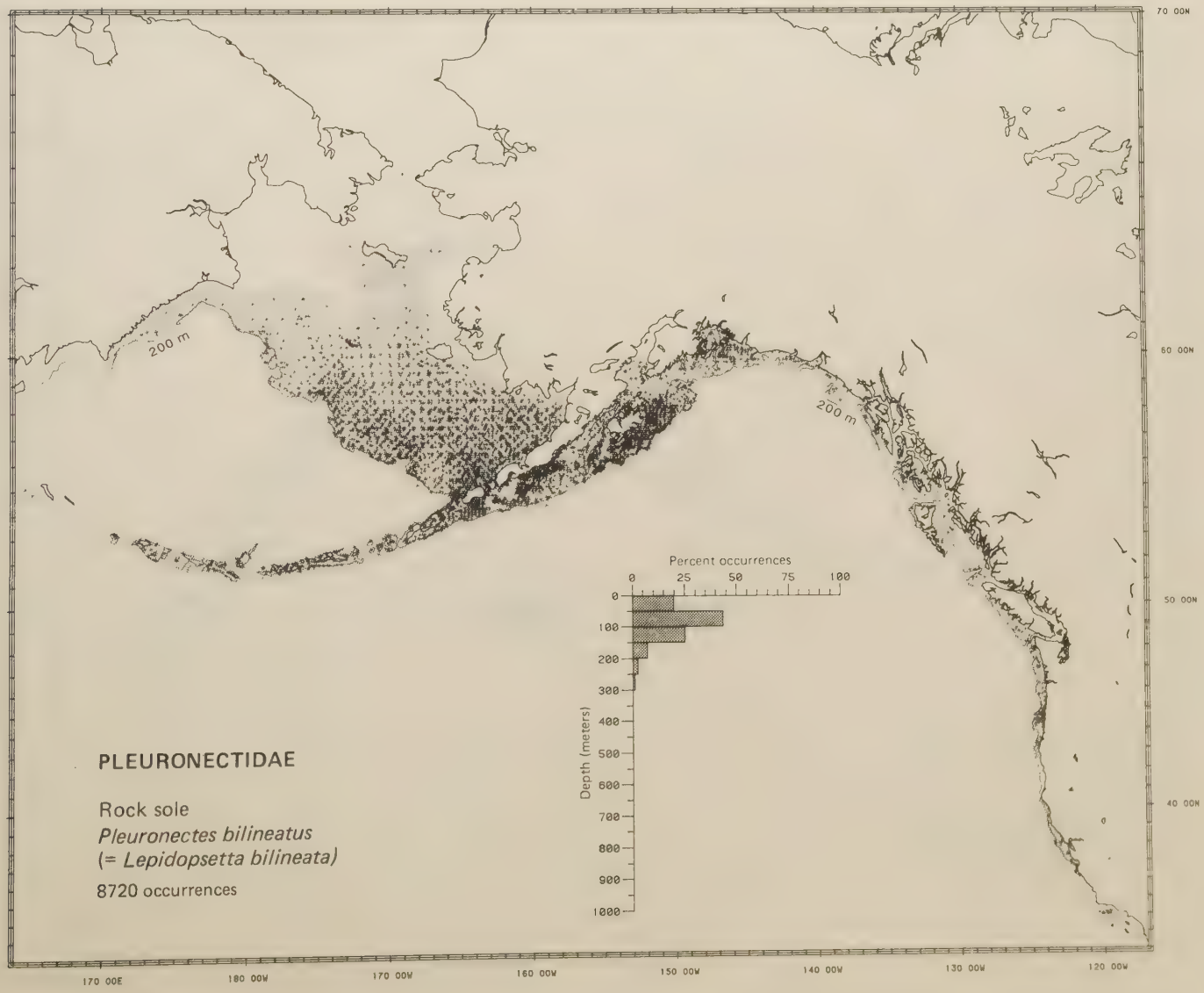
Taxonomic comment The rock sole is *Lepidopsetta bilineata* in Robins (1980), but Sakamoto (1984), the most recent revision of the family Pleuronectidae, placed the species in the genus *Pleuronectes*.

Literature Reported from Korea and the Sea of Okhotsk north to Saint Lawrence Island in the Bering Sea, west in the Aleutian Islands to Attu Island, and south to Tanner Bank, California (Andriyashev 1954; Wilimovsky 1964; Miller and Lea 1972; Quast and Hall 1972; Alton and Sample 1976), at depths of 0 to 390 m (Fedorov 1973a; Howe 1981).

Survey data Found from Bering Island and Cape Olyutorski in the western Bering Sea, north to Saint Lawrence Island, throughout the middle and outer shelf of the eastern Bering Sea, and from Stalemate Bank in the Aleutian Islands to Point Sur, California. Depth range 25 to 575 m, most frequently (43.6% of occurrences) on the middle shelf between 50 to 100 m, and 95.9% of occurrences from depths ≤200 m. Survey data provide a more detailed distribution in the northeastern Bering Sea, extend the known range slightly westward in the Aleutians, and extend the maximum known depth.

Conclusions

Zoogeography	Northeastern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Korea and the Sea of Okhotsk north to Saint Lawrence Island in the Bering Sea, west along the Aleutian Islands to Stalemate Bank, and southeast to Tanner Bank, California
Depth	0 to 575 m



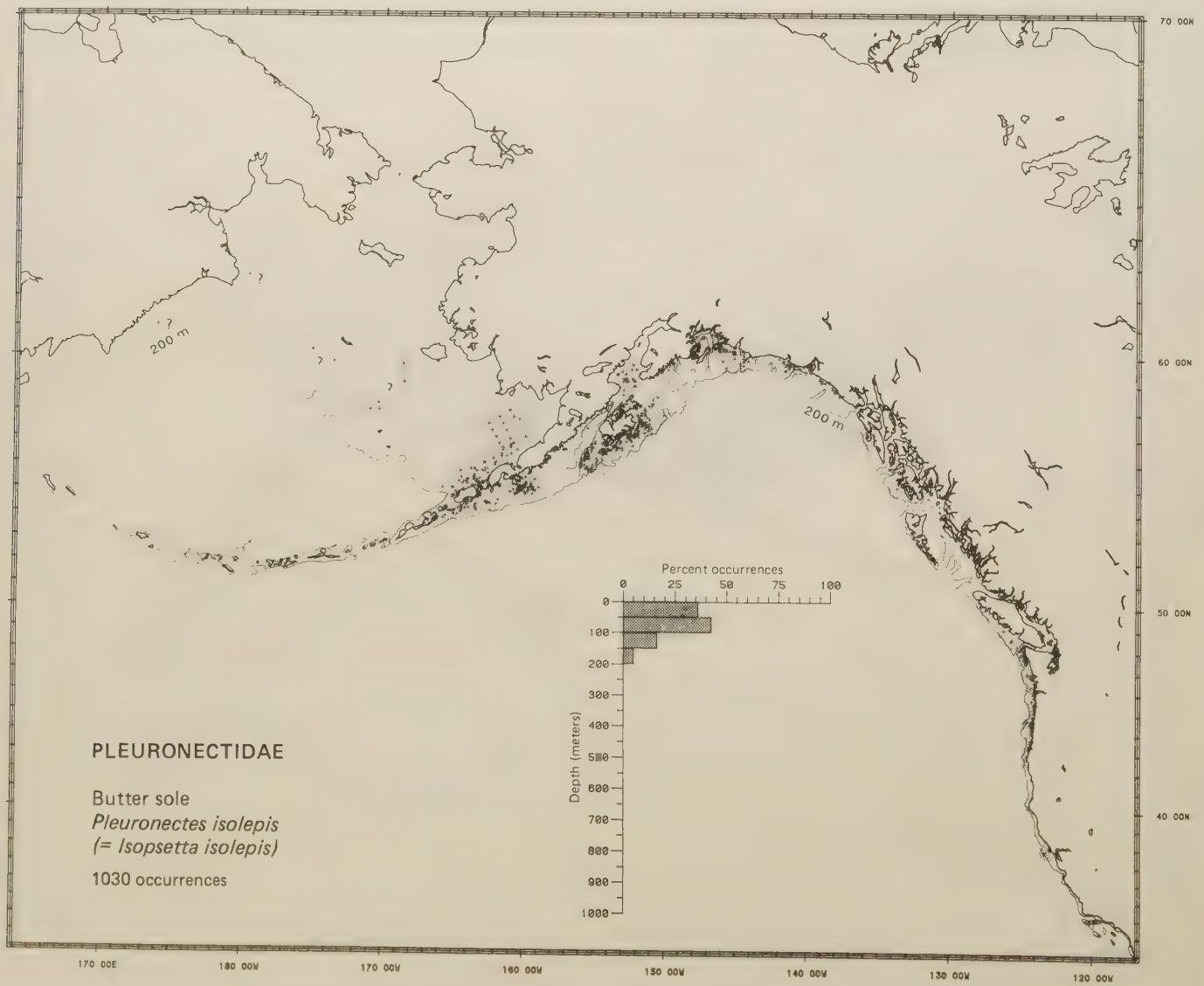
Taxonomic comment The butter sole is *Isopsetta isolepis* in Robins (1980), but Sakamoto (1984), the most recent revision of the family Pleuronectidae, placed the species in the genus *Pleuronectes*.

Literature Reported from the Bering Sea and Amchitka Island in the Aleutian Islands to Ventura, California, and from 20 to 366 m (Wilimovksy 1964; Quast and Hall 1972; Fedorov 1973a; Eschmeyer and Herald 1983).

Survey data Found from south of Hagemeister Island in Bristol Bay, west to Little Sitkin Island in the Aleutian Islands, and southeast to Point Reyes, California. Depth range 25 to 425 m, most commonly (42.4% of occurrences) on the middle shelf between 50 and 100 m, and 94.6% of occurrences from depths ≤150 m. Survey data provide a more detailed distribution in the southeastern Bering Sea and extend the maximum known depth. Although the species has definitely been taken from the southeastern Bering Sea (Kessler 1985), at least some fish identified in the field as butter sole in the northwestern Bering Sea were actually Sakhalin sole, *Pleuronectes* (=*Limanda*) *sakhalinensis* (Hubbs 1915). Records of butter sole from the following locations were considered questionable: off Dezhneva Bay (west of Cape Nizkiy) in the western Bering Sea; east of Cape Navarin; and over the outer shelf of the eastern Bering Sea, north of the Pribilof Islands.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Bristol Bay in the southeastern Bering Sea and Amchitka Island in the Aleutian Islands, to Ventura, California
Depth	20 to 425 m



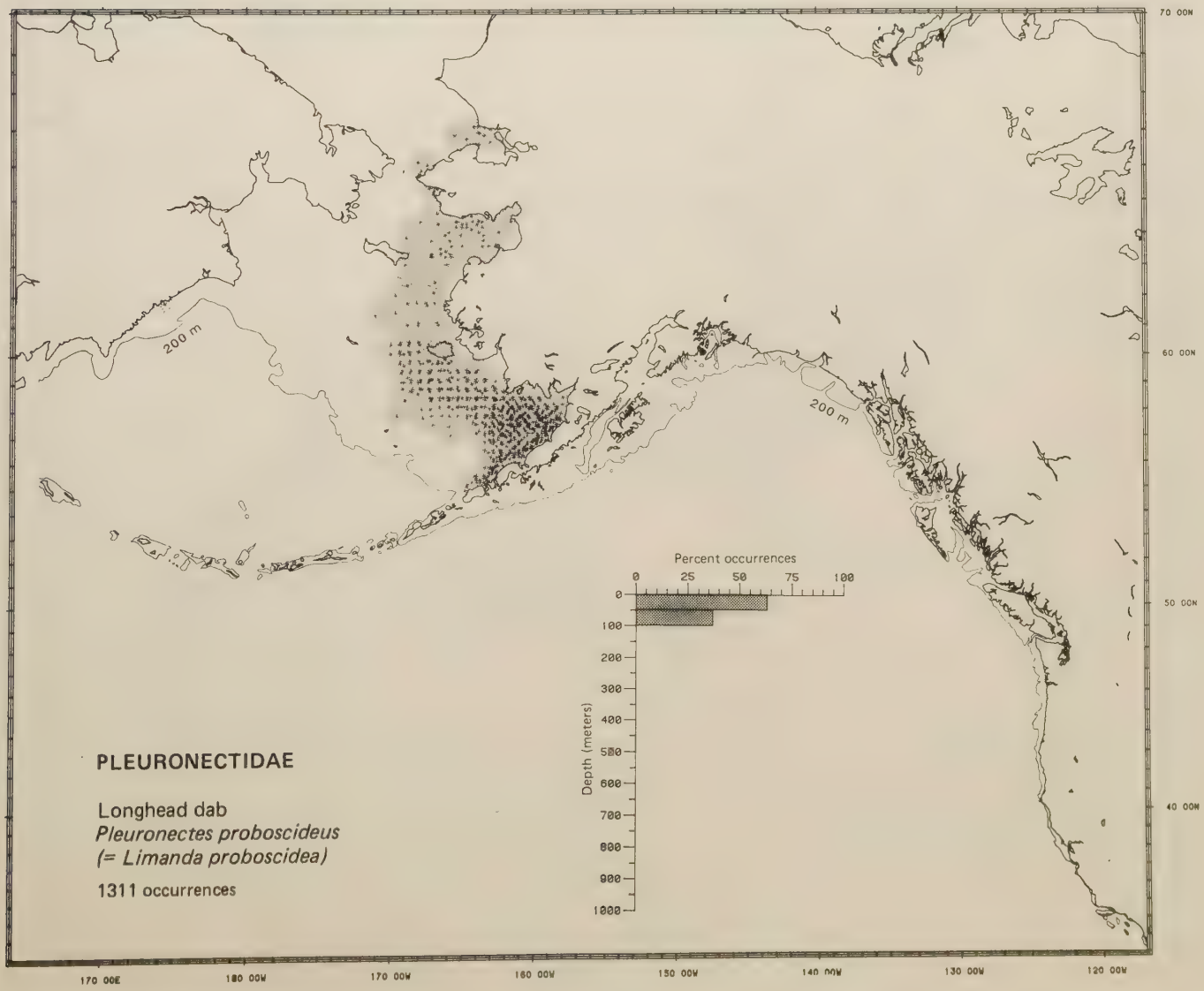
Taxonomic comment The longhead dab is *Limanda proboscidea* in Robins (1980), but Sakamoto (1984), the most recent revision of the family Pleuronectidae, placed the species in the genus *Pleuronectes*.

Literature Reported from southeast of Sakhalin in the Sea of Okhotsk, north to Kotzebue Sound in the Chukchi Sea, south to Unimak Island (Shmidt 1950; Andriyashev 1954; Wolotira et al. 1977), and in depth from 10 to 91 m (Howe 1981; data on file, Northwest and Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Seattle, WA 98115).

Survey data Found at one station off Cape Nizkiy on the Korak Coast of the western Bering Sea, and from Cape Krusenstern (northern Kotzebue Sound) to Unimak Island. Depth range 25 to 125 m, most frequently (63.2% of occurrences) on the inner shelf at depths <50 m, and 99.9% of occurrences from depths ≤100 m. Survey data were all within the known geographic range, but the maximum known depth was extended slightly.

Conclusions

Zoogeography	Arctic-northern boreal Pacific (Okhotsk)
Life zone	Inner shelf-middle shelf (inner shelf)
Range	From the Sea of Okhotsk to Cape Krusenstern in Kotzebue Sound and south to Unimak Island
Depth	10 to 125 m

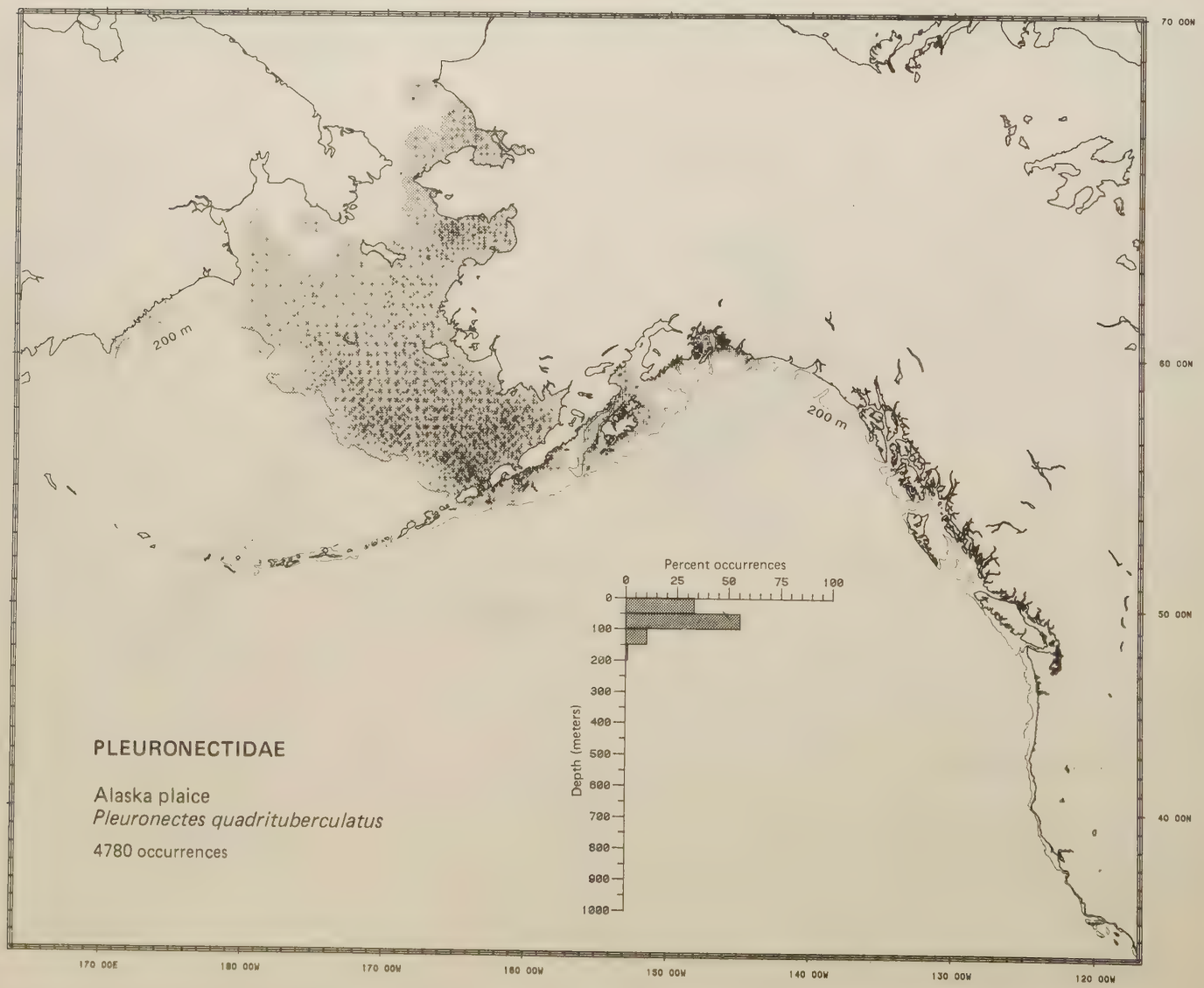


Literature Reported from Peter the Great Bay in the Sea of Japan to the Bering Strait, southeast in the Bering Sea, west in the Aleutian Islands to Unalaska Island, and east to Prince William Sound, Alaska (Andriyashev 1954; Wilimovsky 1964; Quast and Hall 1972), at depths of 6 to 300 m (Andriyashev 1954; Howe 1981).

Survey data Taken from Cape Olyutorski in the western Bering Sea north to Point Hope in the Chukchi Sea, south along the inner and middle shelf of the eastern Bering Sea to Unimak Island, and east to Kayak Island in the northeastern Gulf of Alaska. Depth range 25 to 475 m, most commonly (55.3% of occurrences) on the middle shelf from 50 to 100 m, and 98.6% of occurrences from depths <150 m. Survey data extend the known range north to Point Hope and east to Kayak Island and the maximum known depth.

Conclusions

Zoogeography	Arctic-northern boreal Pacific
Life zone	Inner shelf-outer shelf (middle shelf)
Range	From Peter the Great Bay in the west to Point Hope in the Chukchi Sea, south to Unalaska Island, and east to Kayak Island in the northeastern Gulf of Alaska
Depth	6 to 475 m



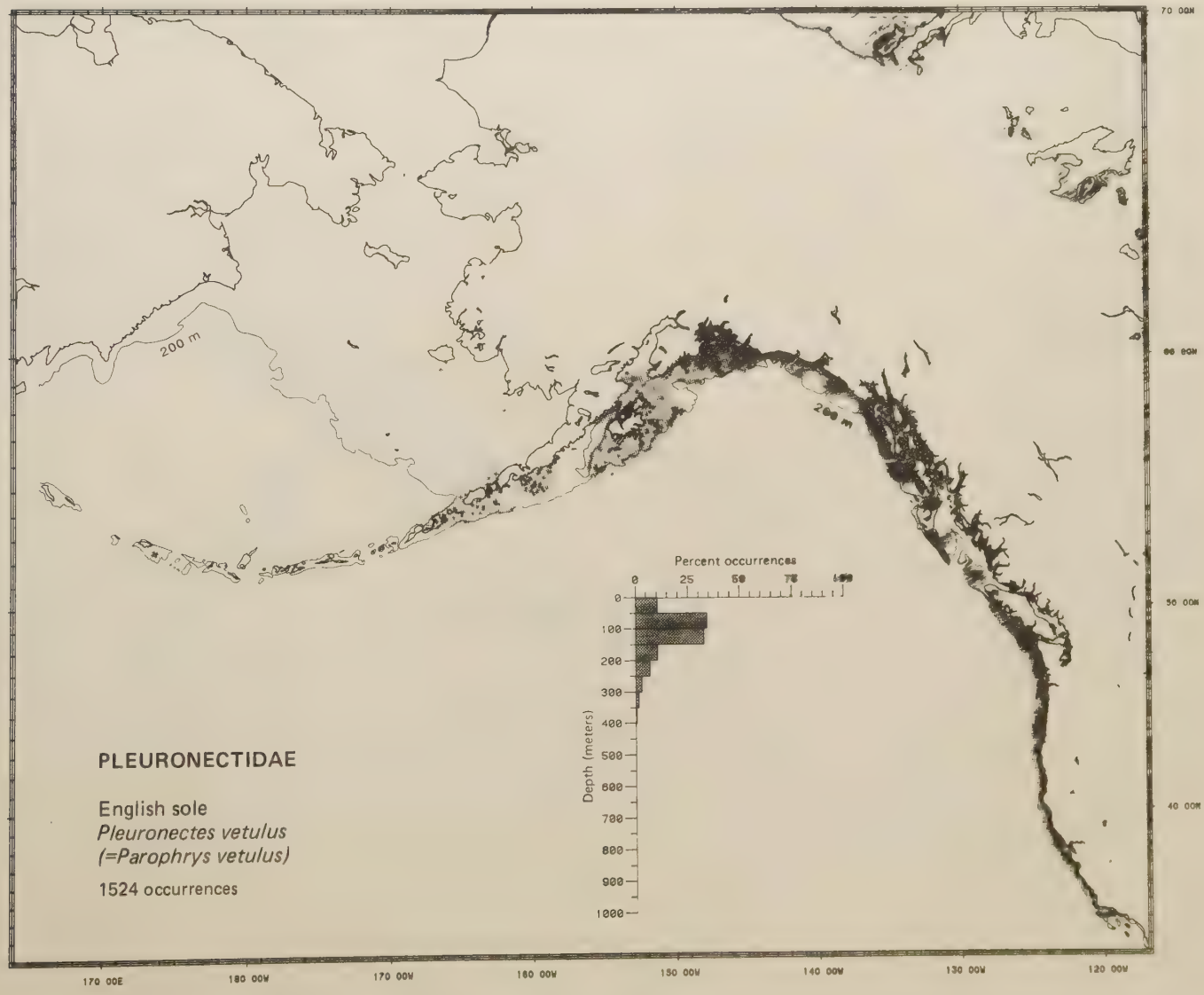
Taxonomic comment The English sole is *Parophrys vetulus* in Robins (1980), but Sakamoto (1984), the most recent revision of the family Pleuronectidae, placed the species in the genus *Pleuronectes*.

Literature Reported from Unimak Island in the Bering Sea, to San Cristobal Bay, Baja California Sur (Miller and Lea 1972; Hart 1973), at depths of 0 to 550 m (Hart 1973).

Survey data Found from Agattu Island in the Aleutian Islands north to Nunivak Island in the eastern Bering Sea and southeast to the Santa Barbara Channel, California. Depth range 25 to 475 m, most frequently (34.2% of occurrences) on the middle shelf from 50 to 100 m, and 94.7% of occurrences from depths <250 m. Survey data extend the known range along the Aleutian Islands and define the distribution in the Bering Sea.

Conclusions

Zoogeography	Eastern boreal Pacific-San Diegan
Life zone	Inner shelf-mesobenthal (middle shelf)
Range	From Agattu Island in the Aleutian Islands and Nunivak Island in the eastern Bering Sea to San Cristobal Bay, Baja California Sur
Depth	0 to 550 m

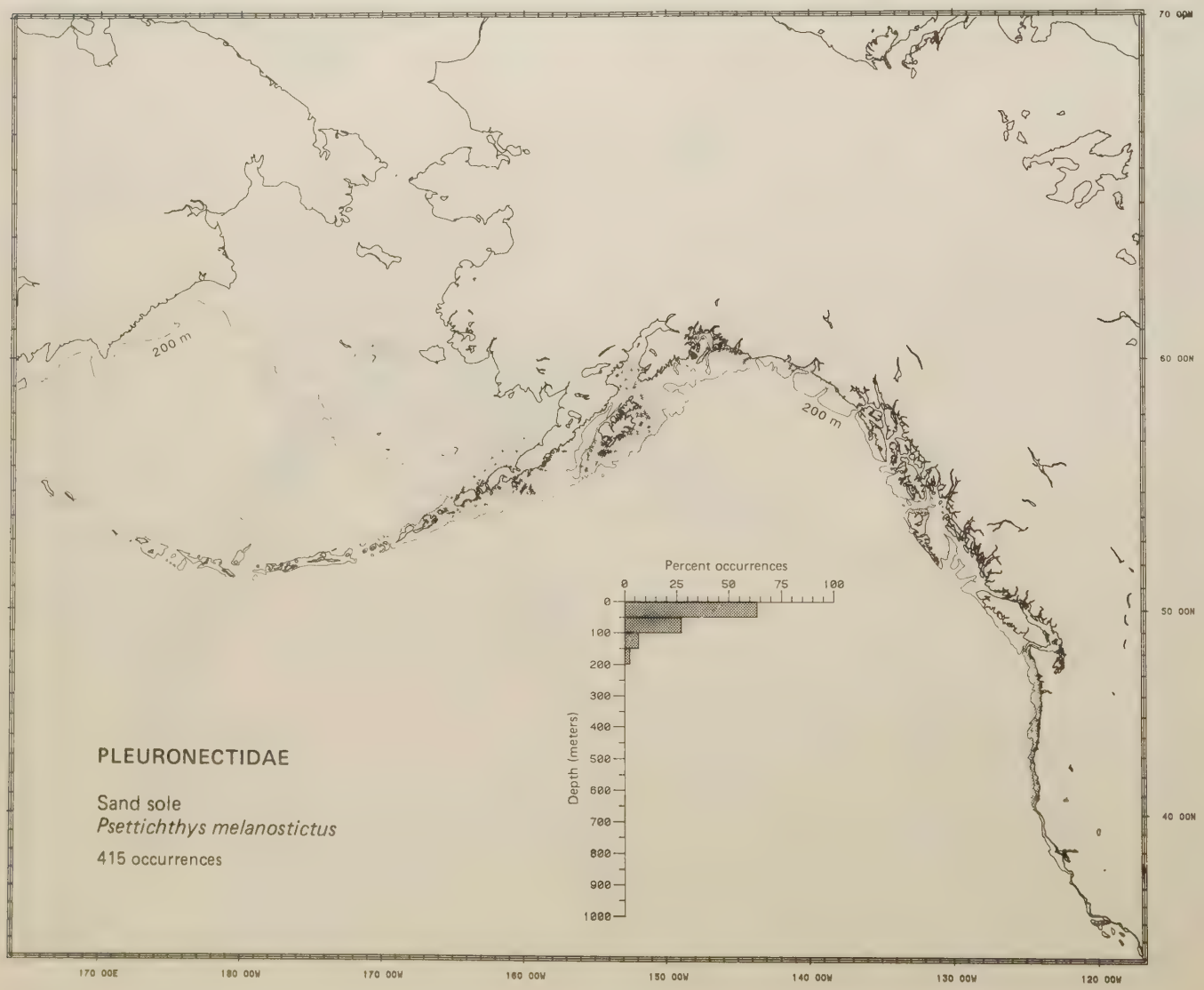


Literature Reported from the Bering Sea to Redondo Beach, California, from 1 to 183 m in depth (Miller and Lea 1972; Howe 1981).

Survey data Found from Unalaska Island in the Aleutian Islands, north in the southeastern Bering Sea to northwest of Port Heiden, Bristol Bay, and southeast to Eureka, California. Depth range 25 to 325 m, most frequently (63.4% of occurrences) on the inner shelf at depths <50 m, and 97.3% of occurrences from depths <150 m. Survey data define the northern and western limits of the range more precisely, extend the known range in the Aleutians, and provide a new survey maximum depth of 325 m. Although the species occurs in the southeastern Bering Sea, the Sakhalin sole, *Pleuronectes sakhalinensis*, may have been confused with this species in regions to the northwest (see account of butter sole, *Pleuronectes isolepis*, for further information on this problem). Records of sand sole that were considered questionable occurred east of Saint Matthew Island and Saint George Island.

Conclusions

Zoogeography	Eastern boreal Pacific
Life zone	Inner shelf-outer shelf (inner shelf)
Range	From Unalaska Island, and Port Heiden in the Bering Sea to Redondo Beach, California
Depth	1 to 325 m



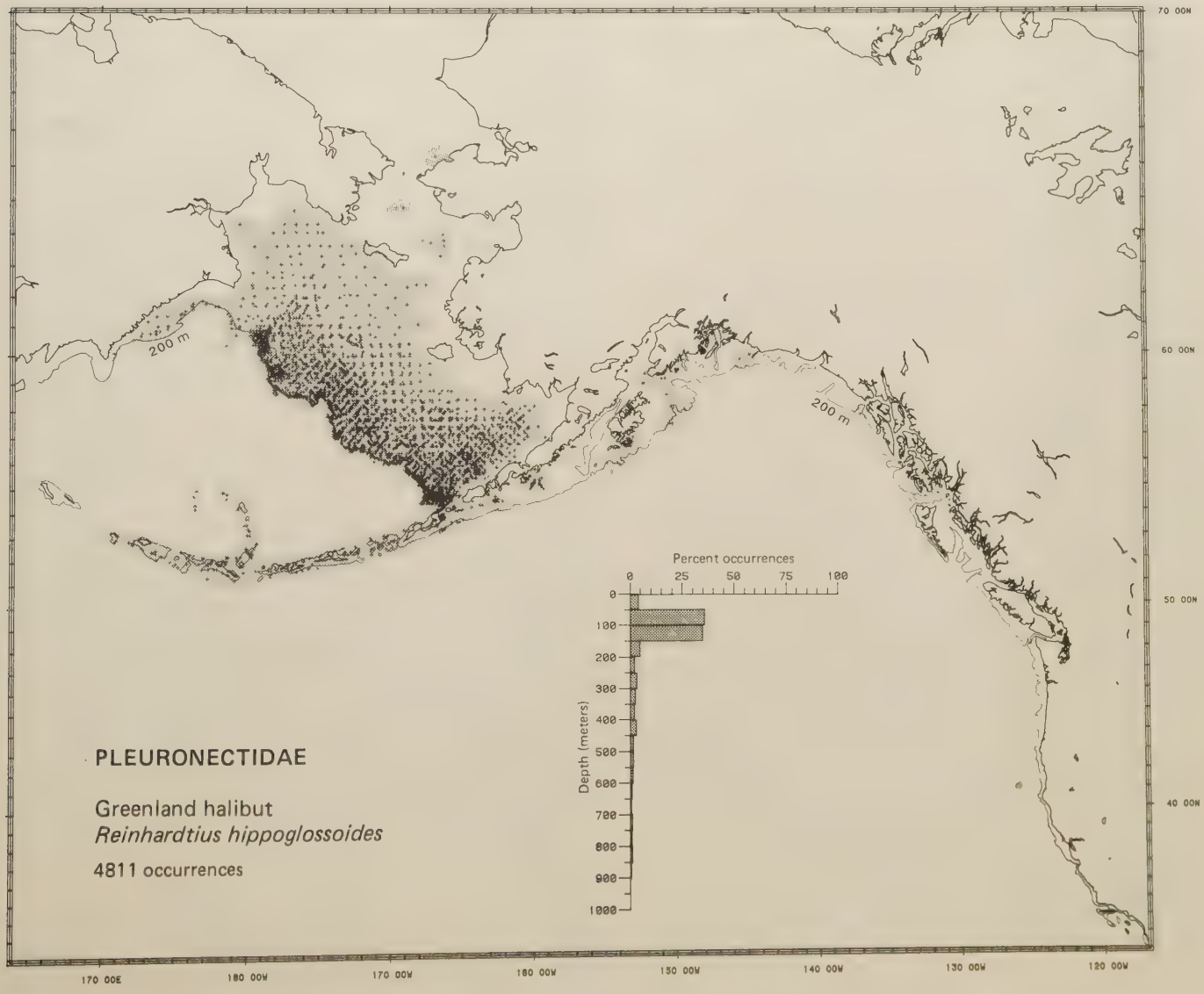
GREENLAND HALIBUT, *Reinhardtius hippoglossoides* (Walbaum 1792) Pleuronectidae: Righteye Flounders

Literature Reported in the Pacific from the Sea of Japan off Honshu, the Sea of Okhotsk, along the Aleutian Islands, north to the Chukchi Sea, southeast to northern Baja California (Shmidt 1950; Miller and Lea 1972; Quast and Hall 1972; Hart 1973; Howe 1981); in the North Atlantic from New Jersey to southern Baffin Island, northwest Greenland, Iceland, Spitsbergen, and the Barents Sea and from there south to Ireland (Leim and Scott 1966; Quast and Hall 1972; Muus 1974), from 14 to 2000 m in depth (Miller and Lea 1972; Muus 1974).

Survey data Found from Medny Seamount and Cape Olyutorski in the western Bering Sea to Shishmaref, Alaska, in the Chukchi Sea, and along the outer shelf of the eastern Bering Sea, along the Aleutian Islands from Stalemate Bank, Ulm Plateau, and Bowers Bank eastward to Cross Sound, southeastern Alaska. Depth range 25 to 1025 m, most frequently (35.7% of occurrences) on the middle shelf from 50 to 100 m, and 95.3% of occurrences from depths <600 m. Survey data were all within the known geographic and depth ranges.

Conclusions

Zoogeography	Arctic-amphiboreal (circumboreal Atlantic-northern boreal Pacific)
Life zone	Inner shelf-bathybenthal (middle shelf)
Range	In the North Pacific, from the Sea of Japan off Honshu north to Shishmaref, Alaska in the Chukchi Sea, throughout the Aleutian Islands, and southeast to northern Baja California. In the North Atlantic, from New Jersey to Spitsbergen and the Barents Sea and from there south to Ireland
Depth	14 to 2000 m



EXTENSIONS OF KNOWN RANGES

The survey data provided extensions of known range (geographic, depth, or both) for 111 species or 91.7% of the total (121 species) in the survey (Table 5). Extensions to the north, to greater depths, and in the Aleutian Islands were the most frequent; 74 species (61.2% of the total) had extensions to the north, 71 (58.7%) had new maximum depth records, and 43 (35.5%) had new extensions in the Aleutian Islands.

These extensions of known range, however, were sometimes questionable. Forty- three represented a more specific location than that mentioned in the general literature. In these cases, a more detailed examination of the literature may show that some of these are not new records. Thirty-eight of the northern, four of the Aleutian, and one southern extension fell into this category.

In 17 cases, the extension may not be real because the record may actually be that of another species and hence may represent a misidentification. Nine of the northern, three of the Aleutian, three shallow, and two deep extensions fell into this category.

Another category includes pelagic species that may have been taken near the surface over deep water. For these species, the maximum depth records found here may overestimate their true maximum depth of occurrence. Seven species fell into this category.

A fourth category includes anomalous distributions (i.e., those records that are questionable because they occur far outside the normal range of the species). Three of the northern, three of the deepwater, two of the shallow, and one of the southern extensions fell into this category.

Table 5

Species for which the known geographic and/or depth ranges were extended by the surveys.* West = western Bering Sea south of Cape Navarin; North and East/South = anywhere along the west coast of America or the eastern Bering Sea; Aleutian = westward extension in the Aleutians.

	Geographic range				Depth range	
Species	West	North	Aleutian	East/ South	Mini- mum	Max- imum
Hydrolagus colliei	–	A	–	–	–	–
Squalus acanthias	–	+	–	–	–	–
Torpedo californica	–	–	–	–	–	+
Bathyraja interrupta	–	B	B	–	B	–
Raja binoculatua	–	A	+	–	–	–
R. rhina	–	+	–	–	+	+
Alosa sapidissima	–	–	–	–	–	C
Clupea pallasii	–	–	–	–	–	C
Mallotus villosus	–	–	–	–	–	C
Osmerus mordax	–	–	–	–	–	C
Thaleichthys pacificus	–	+	+	–	–	C
Oncorhynchus tshawytscha	–	–	–	–	–	C
Chauliodus macouni	–	A	–	–	+	–
Albatrossia pectoralis	–	–	–	–	D	–
Coryphaenoides cinereus	–	A	+	–	+	–
Boreogadus saida	–	–	–	+	–	+
Eleginus gracilis	–	+	–	–	–	+
Gadus macrocephalus	–	–	–	–	–	+
Microgadus proximus	–	A	–	–	–	+
Theragra chalcogramma	–	A	–	–	–	+
Antimora microlepis	–	+	+	–	D	–
Sebastes aleutianus	–	A	A	–	+	+
S. alutus	–	+	+	–	–	+
S. aurora	–	–	–	–	+	–
S. babcocki	–	A	–	–	–	+
S. borealis	–	A	A	+	–	+
S. brevispinis	–	–	–	–	–	+
S. ciliatus	–	A	A	–	–	+
S. crameri	–	A	+	–	+	–
S. elongatus	–	+	–	–	+	+
S. entomelas	–	+	–	–	–	+
S. flavidus	–	+	–	–	–	–
S. goodei	–	+	–	–	–	+
S. helvomaculatus	–	–	–	–	+	–
S. jordani	–	D	–	–	–	–
S. melanostomus	–	B	–	–	B	–
S. paucispinis	–	+	–	–	–	+
S. pinniger	–	+	–	–	–	+
S. polyspinis	–	A	+	–	–	+
S. proriger	–	A	–	–	–	+
S. ruberrimus	–	A	–	–	+	–
S. rubrivinctus	–	B	–	–	–	B
S. saxicola	–	D	–	–	–	–
S. variegatus	–	–	+	D	–	–
S. zacentrus	–	–	+	–	+	+
Sebastolobus alascanus	–	A	+	–	–	–
Anoplopoma fimbria	–	A	–	–	–	–
Hexagrammos stelleri	–	A	–	–	–	D
Ophiodon elongatus	–	–	–	–	–	+
Pleurogrammus monopterygius	–	+	–	–	–	+
Eumicrotremus orbis	–	–	–	–	–	+
Dasycottus setiger	–	A	+	–	–	+
Malacocottus kincaidi	–	B	B	–	–	B
M. zonurus	–	B	B	–	B	–
Aspidophoroides bartoni	–	–	–	A	–	+
Bathyagonus nigripinnis	–	A	A	–	–	–
Occella dodecaedrom	–	+	+	–	–	+
O. verrucosa	–	B	–	–	–	+
Podothecus acipenserinus	–	–	–	+	–	+
Sarritor frenatus	–	+	+	–	–	+
Hemitripterus bolini	+	–	+	–	+	+
Enophrys diceraus	–	A	–	–	+	+
Gymnocanthus galeatus	–	A	+	–	–	D
G. pistilliger	–	–	–	–	–	+
G. tricuspis	–	–	+	–	–	D
Hemilepidotus hemilepidotus	–	B	–	–	–	+
H. jordani	–	+	–	–	+	+
H. papilio	–	–	+	–	–	+
Icelinus filamentosus	–	+	–	–	–	–
Icelus canaliculatus	–	A	+	–	–	+
I. spiniger	–	A	+	–	+	–
Myoxocephalus jaok	–	A	–	–	–	–
M. polyacanthocephalus	–	+	–	–	–	+
Triglops forficata	+	+	+	+	–	+
T. macellus	+	A	–	–	–	+
T. pingeli	–	–	+	–	–	–
T. scepticus	–	A	+	–	+	+
Zalembius rosaceus	–	+	–	–	–	–
Bathymaster signatus	–	–	+	–	–	+
Ronquilus jordani	–	A	–	–	–	+
Bothrocara brunneum	–	+	+	–	+	–
Lycodes brevipes	–	–	+	+	+	–
L. concolor	–	A	+	–	–	+
L. cortezianus	–	D	–	–	–	–
L. diapterus	–	A	+	–	–	–
L. palearis	–	–	+	–	–	+
L. raridens	–	–	–	+	+	+
L. turneri	–	–	–	+	+	+
Lumpenella longirostris	–	A	+	–	+	+
Lumpenus fabricii	–	–	–	–	–	+

Table 5 (Continued)

Species	Geographic range: West	North	Aleutian	East/ South	Depth range: Minimum	Maximum
Lumpenus maculatus	–	–	+	–	–	–
L. sagitta	–	A	–	–	+	+
Zaprora silenus	–	A	–	+	–	+
Trichodon trichodon	–	A	–	–	+	+
Ammodytes hexapterus	–	–	–	–	–	C
Atheresthes evermanni	–	–	–	–	+	–
A. stomias	+	+	–	–	–	–
Eopsetta exilis	–	–	–	–	+	–
Errex zachirus	+	A	+	–	–	–
Hippoglossoides elassodon	–	–	+	+	–	–
H. robustus	–	–	–	–	–	+
Hippoglossus stenolepis	–	+	–	–	–	–
Microstomus pacificus	–	A	+	–	–	–
Platichthys stellatus	–	–	–	–	–	+
Pleuronectes asper	–	A	–	–	–	–
P. bilineatus	–	A	+	–	–	+
P. isolepis	–	B	–	–	–	+
P. proboscideus	–	–	–	–	–	+
P. quadrituberculatus	–	+	–	+	–	+
P. vetulus	–	A	+	–	–	–
Psettichthys melanostictus	–	B	+	–	–	+
Total	5	74	43	11	29	71

Symbols:
- – no extension of known range
- + apparently valid extension of known range
- A extension because survey data provided a more specific record within a general area given in the literature
- B extension but possibly confused with other species
- C extension but may have been taken near the surface over deep water
- D extension appears to be anomalous

*Survey species with no extensions of known range:
Leuroglossus schmidti, *Liparis gibbus*, *Merluccius productus*, *Myoxocephalus verrucosus*, *Porichthys notatus*, *Citharichthys sordidus*, *Sebastes diploproa*, *Eopsetta jordani*, *Aptocyclus ventricosus*, *Reinhardtius hippoglossoides*

ZOOGEOGRAPHIC AND LIFE ZONE CLASSIFICATION

Zoogeographic groups

As might be expected from the area covered, all species examined had Arctic and/or temperate North Pacific affinities. Of 121 species (excluding three species complexes) 71 (58.7%) were boreal, 33 (27.3%) had ranges extending into the Arctic, and 17 (14.0%) were temperate (Table 6).

Species with Arctic affinities had distributions that fell into the following major classes: 1) Arctic; 2) Arctic-Boreal Atlantic; 3) Arctic-Amphiboreal; and 4) Arctic-Boreal Pacific. By far the greatest number (24) of species were Arctic-Boreal Pacific, followed by Arctic-Amphiboreal with five, Arctic-Boreal Atlantic with three, and Arctic with one. Of the Arctic-Boreal Pacific species, the greatest number of species (6) were Arctic-Northern Boreal Pacific, followed by Arctic-Okhotsk and Arctic-circumboreal Pacific with five each.

Species with boreal affinities had distributions that fell into the following major classes: 1) Amphiboreal-American, and 2) Boreal Pacific. Only one species (which was introduced to the Pacific Coast from the Atlantic) showed an Amphiboreal-American distribution, and 70 were Boreal Pacific. Of the Boreal Pacific species, the greatest number (35) were Eastern Boreal Pacific, followed by Northern Boreal Pacific with ten, and Kurile-Aleutian with eight.

Species with temperate affinities comprised two major groups: 1) Antitropical Temperate, with a single species, and 2) Temperate North Pacific, with 16 species. Of this latter category, 15 were Eastern Temperate Pacific with various combinations of provinces. The greatest number of species (10) had Oregonian-San Diegan distributions.

Life zone and depth zone groups

Because most samples from the surveys were taken with demersal trawls, most (109; 90.1% of the total) of the species were demersal and 12 (9.9%) were pelagic. Of the 121 species, four (3.3%) had freshwater affinities, two (1.6%) had estuarine affinities, and one (0.8%) had intertidal affinities (Table 7). The greatest number (62) of species were sublittoral-bathyal, followed by sublittoral with 38, and bathyal with seven, neritic-oceanic with five, and oceanic with two. The life zones with the greatest number of species were inner shelf-outer shelf with 27, middle shelf-mesobenthal with 23, and inner shelf-mesobenthal with 20.

In terms of the depth zone of modal occurrence, the greatest number (47; 38.8% of the total) of species were found on the outer shelf, 27 (22.3%) on the middle shelf, 15 (12.4%) on the mesobenthal slope, and 14 (11.6%) on the inner shelf (Table 8). It is interesting to note that the percentage of samples in each depth category was similar to the percentage of species with centers of distribution in each depth category (i.e., 38.5% of the total samples were on the outer shelf, 24.1% on the middle shelf, 18.4% on the mesobenthal slope and 15.4% on the inner shelf (Table 1).

In general, the species within a family differed in distribution pattern (zoogeographic and life zone patterns combined; Table 8). The greatest overlap in distribution patterns occurred in the family Scorpaenidae. Seven species of rockfish (darkblotched rockfish, *Sebastes crameri*; greenstriped rockfish, *S. elongatus*; widow rockfish, *S. entomelas*; yellowtail rockfish, *S. flavidus*; bocaccio, *S. paucispinis*; canary rockfish, *S. pinniger*; and yelloweye rockfish, *S. ruberrimus*) are eastern boreal Pacific, middle shelf-mesobenthal (outer shelf) species. Three pairs of rockfishes (silvergray rockfish, *S. brevispinis* and redstripe rockfish, *S. proriger*; rosethorn rockfish, *S. helvomaculatus*, and sharpchin rockfish, *S. zacentrus*; and chilipepper, *S. goodei*, and shortbelly rockfish, *S. jordani*) also have overlapping distribution patterns. In addition to these, sympatric species pairs occurred in the Rajidae (big skate, *Raja binoculata*, and longnose skate, *R. rhina*), Macrouridae (giant grenadier, *Albatrossia pectoralis*, and popeye grenadier, *Coryphaenoides cinereus*), and Pleuronectidae (arrowtooth flounder, *Atheresthes stomias*, and petrale sole, *Eopsetta jordani*; slender sole, *E. exilis*, and rex sole, *Errex zachirus*).

Table 6

Zoogeographic classification of common fishes of the Bering Sea and northeastern Pacific.

Zoogeographic category and species	Zoogeographic provinces															
	North Pacific											North Atlantic				
	T	S	J	O	K	Ok	A	Or	SD	C	Arctic	Cr	W	E	L	Other
Arctic affinities																
Arctic																
Boreogadus saida											X					
Arctic-Boreal Atlantic																
Arctic-Western Boreal Atlantic																
Liparis gibbus					–		–				X		X			
Lycodes turneri											X		X			
Arctic-Circumboreal Atlantic																
Gymnocanthus tricuspis							–				X		X	X		
Arctic-Amphiboreal																
Arctic-W. Boreal Atlantic-N. Boreal Pacific																
Osmerus mordax				–	X	X	X				X		X			
Triglops pingeli					X	X	X				X		X			
Arctic-Circumboreal Atlantic-N. Boreal Pacific																
Mallotus villosus				–	X	X	X	–			X		X	X		
Lumpenus maculatus					X	X	X				X		X	X		
Reinhardtius hippoglossoides				–	X	X	X	–	–		X		X	X		
Arctic-Boreal Pacific																
Arctic-Okhotsk																
Occella dodecaedron					–	X	–				X					
Hemilepidotus papilio					–	X	–				X					
Lycodes raridens						X					X					
Hippoglossoides robustus						X	–				X					
Pleuronectes proboscideus						X	–				X					
Arctic-Northern Boreal Pacific																
Eumicrotremus orbis					X	X	X				X					
Aspidophoroides bartoni					X	X	X				X					
Enophrys diceraus					X	X	X				X					
Myoxocephalus jaok				–	X	X	X				X					
Lumpenus fabricii					X	X	X				X					
Pleuronectes quadrituberculatus					X	X	X				X					
Arctic-Northwestern Boreal Pacific																
Eleginus gracilis				X	X	X	X				X					
Pleuronectes asper				X	X	X	X				X					
Arctic-Northeastern Boreal Pacific																
Ammodytes hexapterus					X	X	X	X	–		X					
Hippoglossus stenolepis					X	X	X	X	–		X					
Arctic-Circumboreal Pacific																
Clupea pallasii				X	X	X	X	X	–		X					
Theragra chalcogramma		–		X	X	X	X	X			X					
Hexagrammos stelleri				X	X	X	X	X			X					
Lycodes palearis				X	X	X	X	X			X					
Platichthys stellatus				X	X	X	X	X	–		X					
Arctic-Oceanic and NE Boreal Pacific																
Oncorhynchus tshawytscha	X	X		–	X	X	X	X	–		X					X[1]
Arctic-Aleutian																
Myoxocephalus verrucosus					–		X				X					
Bathymaster signatus					–		X				X					
Arctic-Eastern Boreal Pacific																
Podothecus acipenserinus							X	X			X					
Boreal affinities																
Amphiboreal American																
W. Boreal Atlantic-NE Boreal Pacific																
Alosa sapidissima					–		X	X	–		–		–	X		
Boreal Pacific																
Northern Boreal Pacific																
Dasycottus setiger				–	X	X	X									
Malacocottus zonurus					X	X	X									
Sarritor frenatus					X	X	X									
Gymnocanthus pistilliger					X	X	X									
Icelus canaliculatus					X	X	X									
I. spiniger				–	X	X	X									
Triglops scepticus					X	X	X									
Lycodes concolor					X	X	X									
Lumpenella longirostris					X	X	X									
Atheresthes evermanni					X	X	X									

Table 6 (Continued)

Zoogeographic category and species	Zoogeographic provinces															
	North Pacific										North Atlantic					
	T	S	J	O	K	Ok	A	Or	SD	C	Arctic	Cr	W	E	L	Other
Boreal affinities (Continued)																
Boreal Pacific (Continued)																
Northwestern Boreal Pacific																
Pleurogrammus monopterygius				X	X	X	X	—	—							
Northeastern Boreal Pacific																
Albatrossia pectoralis				—	X	X	X	X	—							
Coryphaenoides cinereus				—	X	X	X	X								
Bothrocara brunneum					X	X	X	X	—							
Lycodes brevipes					X	X	X	X								
L. diapterus					X	X	X	X	—							
Zaprora silenus					X	X	X	X								
Pleuronectes bilineatus				—	X	X	X	X	—							
Circumboreal Pacific																
Gadus macrocephalus				X	X	X	X	X								
Aleutian																
Sebastes ciliatus							X									
S. polyspinis					—		X									
S. variegatus							X	?								
Hemitripterus bolini					—		X	—								
Triglops forficata					—		X									
T. macellus							X									
Kurile-Aleutian																
Sebastes alutus					X		X	—	—							
Aptocyclus ventricosus		—			X		X									
Malacocottus kincaidi					X	—	X									
Gymnocanthus galeatus					X		X									
Hemilepidotus jordani				—	X		X									
Myoxocephalus polyacanthocephalus				—	X		X									
Lumpenus sagitta					X		X	—								
Hippoglossoides elassodon					X		X	—								
Eastern Boreal Pacific																
Bathyraja interrupta							X	X	—							
Raja binoculata							X	X	—							
R. rhina							X	X	—							
Thaleichthys pacificus							X	X								
Microgadus proximus							X	X								
Sebastes aleutianus					—		X	X	—							
S. babcocki							X	X	—							
S. borealis					—		X	X								
S. brevispinis							X	X	—							
S. crameri							X	X	—							
S. elongatus							X	X	—							
S. entomelas							X	X	—							
S. flavidus							X	X	—							
S. helvomaculatus							X	X	—							
S. paucispinis							X	X	—							
S. pinniger							X	X	—							
S. proriger							X	X	—							
S. ruberrimus							X	X	—							
S. zacentrus							X	X								
Sebastolobus alascanus					-	—	X	X	—							
Anoplopoma fimbria				—	—		X	X	—							
Ophiodon elongatus							X	X	—							
Bathyagonus nigripinnis					—		X	X								
Occella verrucosa							X	X								
Hemilepidotus hemilepidotus					—		X	X								
Icelinus filamentosus							X	X	—							
Ronquilus jordani							X	X								
Lycodes cortezianus							X	X	—							
Trichodon trichodon					—		X	X								
Atheresthes stomias							X	X								
Eopsetta exilis							X	X								
E. jordani							X	X								
Errex zachirus							X	X	—							
Pleuronectes isolepis							X	X	—							
Psettichthys melanostictus							X	X	—							
Oceanic Subarctic Pacific																
Leuroglossus schmidti		X														

Table 6 (Continued)

Zoogeographic category and species	Zoogeographic provinces: North Pacific T	S	J	O	K	Ok	A	Or	SD	C	Arctic	North Atlantic Cr	W	E	L	Other
Boreal affinities (Continued)																
Boreal Pacific (Continued)																
Oceanic Boreal Pacific																
Chauliodus macouni	X	X														
Temperate affinities																
Antitropical temperate																
Squalus acanthias			X	X	X	X	X	X	X	?		X	X	X	X	X[2]
Temperate North Pacific																
Antimora microlepis			X	X	X	X	X	X	X	X						X[3]
Eastern Boreal Pacific-San Diegan																
Microstomus pacificus							X	X	X							
Pleuronectes vetulus							X	X	X							
Eastern Temperate Pacific																
Sebastes diploproa							X	X	X	X						
Oregonian-San Diegan																
Torpedo californica							—	X	X							
Merluccius productus							—	X	X							
Porichthys notatus							—	X	X							
Sebastes aurora								X	X							
S. goodei								X	X							
S. jordani							—	X	X							
S. melanostomus								X	X							
S. rubrivinctus								X	X							
S. saxicola							—	X	X							
Citharichthys sordidus								X	X							
Oregonian-Californian																
Hydrolagus colliei								X	X	X						
Zalembius rosaceus								X	X	X						

[1]Introduced successfully into Aukland and Cookian Provinces of New Zealand.

[2]Also common in Southern Hemisphere in the following provinces: Southwestern Africa; Agulhas; Southwestern Australian; Tasmanian; Southeastern Australian; Aukland; Cookian; Peru-Chilean; and Magellan. Occasionally in Eastern South American, Caribbean, West Indian, and Western Indian Ocean. Possibly in Indo-Polynesian.

[3]Also along slope of some Indo-Polynesian Islands in North Pacific.

Symbols:
- X Province is major part of range
- — Present in province but occurrence is occasional or undetermined
- ? Uncertain

Province abbreviations:

T	Transition Zone	Or	Oregonian
S	Oceanic Subarctic	SD	San Diegan
J	Japan	C	Californian
O	Oriental	Cr	Carolinan
K	Kurile	W	Western Boreal Atlantic
Ok	Okhotsk	E	Eastern Boreal Atlantic
A	Aleutian	L	Lusitanian

Table 7

Life zone classification of common fishes of the Bering Sea and northeastern Pacific. Life zone designation in parentheses indicates major zone of occurrence.

Life zone category and species	Life zones: Freshwater F	E	Pelagic: Oceanic N	EP	MP	BP	Benthic: Sublittoral I	IS	MS	OS	Bathyal MB	BB	AB
Pelagic species													
Fluvial-Neritic (Neritic)													
Osmerus mordax	X	X	M	—	?								
Fluvial-Oceanic (Neritic)													
Alosa sapidissima	X	X	M	X	?								
Thaleichthys pacificus	X	X	M	X	?								
Oncorhynchus tshawytscha	X	X	M	X	?								
Estuarine-Epipelagic (Neritic)													
Clupea pallasii		X	M	X	?								
Neritic-Epipelagic (Neritic)													
Mallotus villosus			M	X	?								
Boreogadus saida	—	—	M	X	?								
Neritic-Mesopelagic (Neritic)													
Merluccius productus			M	X	X								
Theragra chalcogramma			M	X	X								
Aptocyclus ventricosus			M	X	X	?							
Mesopelagic (Mesopelagic)													
Leuroglossus schmidti				—	M	—							
Chauliodus macouni				—	M	—							

Table 7 (Continued)

Life zone category and species	Life zones												
			Pelagic				Benthic						
	Freshwater			Oceanic				Sublittoral			Bathyal		
	F	E	N	EP	MP	BP	I	IS	MS	OS	MB	BB	AB
Demersal species													
Estuarine-Outer Shelf (Inner Shelf)													
Platichthys stellatus	—	X	L					M	X	X			
Estuarine-Mesobenthal (Outer Shelf)													
Ophiodon elongatus		X	L					X	X	M	X	—	
Intertidal-Mesobenthal (Outer Shelf)													
Porichthys notatus			—	—			X	X	X	M	X		
Inner Shelf													
Eleginus gracilis	—	—	—					M	—				
Inner Shelf-Middle Shelf (Inner Shelf)													
Hexagrammos stelleri			L				—	M	X	—	?		
Occella dodecaedron			L					M	X	—	—		
Enophrys diceraus			L					M	X	—			
Gymnocanthus pistilliger			L					M	X	—	—		
Lycodes turneri								M	X	—			
Lumpenus fabricii			L				—	M	X	—			
Ammodytes hexapterus			—				—	M	X	—	—		
Pleuronectes proboscideus			L					M	X	—			
Inner Shelf-Outer Shelf													
Inner Shelf Mode													
Occella verrucosa			L					M	X	X	—		
Gymnocanthus tricuspis			L					M	X	X	—	?	
Myoxocephalus jaok			L					M	X	X	—	—	
Psettichthys melanostictus			L					M	X	X	—		
Middle Shelf Mode													
Microgadus proximus		—	—					X	M	X	—		
Eumicrotremus orbis			L					X	M	X	—	—	
Liparis gibbus			L					X	M	X	—		
Aspidophoroides bartoni			L					X	M	X	—		
Podothecus acipenserinus			L					X	M	X	—		
Gymnocanthus galeatus			L					X	M	X	—	—	
Hemilepidotus papilio			L					X	M	X	—		
Myoxocephalus verrucosus			L					X	M	X	—	—	
Triglops macellus			L					X	M	X	—		
T. pingeli			L					X	M	X	—		
Lycodes palearis								X	M	X	—	—	
L. raridens								X	M	X			
Lumpenus maculatus			L					X	M	X	—		
L. sagitta			L					X	M	X	—		
Trichodon trichodon			—					X	M	X	—		
Citharichthys sordidus			L					X	M	X	—	—	
Hippoglossoides robustus			L					X	M	X	—		
Pleuronectes asper			L					X	M	X	—	—	
P. bilineatus			L					X	M	X	—	—	
P. isolepis			L					X	M	X	—		
P. quadrituberculatus			L					X	M	X	—		
Outer Shelf Mode													
Triglops forficata			L					X	X	M	—		
Ronquilus jordani			L					X	X	M	—		
Inner Shelf-Mesobenthal													
Middle Shelf Mode													
Myoxocephalus polyacanthocephalus			L					X	M	X	X	—	
Hippoglossus stenolepis			L	L				X	M	X	X	—	
Pleuronectes vetulus			L					X	M	X	X	—	
Outer Shelf Mode													
Squalus acanthias			—	—			—	X	X	M	X	—	
Raja binoculata								X	X	M	X	—	
R. rhina								X	X	M	X	—	
Gadus macrocephalus			—					X	X	M	X	—	
Sebastes saxicola			—	J				X	X	M	X	—	
S. variegatus			—	J				X	X	M	X	—	
Pleurogrammus monopterygius			—	—			—	X	X	M	X	—	
Hemilepidotus jordani			L					X	X	M	X	—	
Icelus spiniger			L					X	X	M	X	—	
Lycodes brevipes								X	X	M	X	—	
Lumpenella longirostris			L					X	X	M	X	—	
Zaprora silenus					J			X	X	M	X	—	

Table 7 (Continued)

Life zone category and species	Life zones												
			Pelagic				Benthic						
	Freshwater		Oceanic				Sublittoral				Bathyal		
	F	E	N	EP	MP	BP	I	IS	MS	OS	MB	BB	AB
Demersal species (Continued)													
Inner Shelf-Mesobenthal (Continued)													
Outer Shelf Mode (Continued)													
Atheresthes stomias			L					X	X	M	X	—	
Eopsetta jordani			L					X	X	M	X	—	
Hippoglossoides elassodon			L					X	X	M	X	—	
Microstomus pacificus			L	L				X	X	M	X	—	
Mesobenthal Mode													
Sebastes rubrivinctus			L					X	X	X	M		
Inner Shelf-Bathybenthal													
Middle Shelf Mode													
Reinhardtius hippoglossoides			—	—	—	—		X	M	X	X	X	
Outer Shelf Mode													
Anoplopoma fimbria			—	—	—	—		X	X	M	X	X	—
Middle Shelf-Outer Shelf (Middle Shelf)													
Zalembius rosaceus								—	M	X	—		
Middle Shelf-Mesobenthal													
Middle Shelf Mode													
Hemilepidotus hemilepidotus			L				—	—	M	X	X		
Outer Shelf Mode													
Hydrolagus colliei								—	X	M	X	—	
Torpedo californica			—					—	X	M	X		
Bathyraja interrupta								—	X	M	X	—	
Sebastes crameri			—					—	X	M	X	—	
S. elongatus			L					—	X	M	X		
S. entomelas			—					—	X	M	X		
S. flavidus			—					—	X	M	X	—	
S. goodei			—					—	X	M	X		
S. jordani			—					—	X	M	X		
S. paucispinis			—					—	X	M	X		
S. pinniger			—					—	X	M	X		
S. polyspinis			—						X	M	X	—	
S. ruberrimus			L					—	X	M	X	—	
Dasycottus setiger			L					—	X	M	X	—	
Hemitripterus bolini			L					—	X	M	X	—	
Icelinus filamentosus			L					—	X	M	X	—	
Triglops scepticus			L					—	X	M	X	—	
Bathymaster signatus			L					—	X	M	X	—	
Atheresthes evermanni			L					—	X	M	X	—	
Eopsetta exilis			L	L				—	X	M	X	—	
Errex zachirus			L	L				—	X	M	X	—	
Mesobenthal Mode													
Sebastes aleutianus			—					—	X	X	M	—	
Middle Shelf-Bathybenthal													
Outer Shelf Mode													
Sarritor frenatus			L					—	X	M	X	X	
Mesobenthal Mode													
Sebastes borealis			L					—	X	X	M	X	
Bathyagonus nigripinnis			L					—	X	X	M	X	
Outer Shelf-Mesobenthal													
Outer Shelf Mode													
Sebastes alutus			—	J				—	—	M	X	—	
S. brevispinis			—					—	—	M	X		
S. ciliatus			—					—	—	M	X	—	
S. proriger			—					—	—	M	X		
Mesobenthal Mode													
Sebastes aurora			—							X	M	—	
S. babcocki			L					—	—	X	M	—	
S. diploproa			—					—	—	X	M	—	
S. helvomaculatus			L					—	—	X	M	—	
S. zacentrus			—					—	—	X	M		
Lycodes cortezianus									—	X	M	—	
Outer Shelf-Bathybenthal (Mesobenthal)													
Sebastolobus alascanus				J				—	—	X	M	X	
Malacocottus kincaidi					L			—	—	X	M	X	
M. zonurus					L				—	X	M	X	
Lycodes diapterus								—	—	X	M	X	

Table 7 (Continued)

Life zone category and species	Life zones												
			Pelagic				Benthic						
	Freshwater			Oceanic			Sublittoral				Bathyal		
	F	E	N	EP	MP	BP	I	IS	MS	OS	MB	BB	AB
Demersal species (Continued)													
Mesobenthal-Bathybenthal													
Mesobenthal Mode													
Sebastes melanostomus			L							—	M	X	
Bathybenthal Mode													
Albatrossia pectoralis								—	—	—	X	M	
Coryphaenoides cinereus											X	M	–
Antimora microlepis								?	?	—	X	M	—
Icelus canaliculatus			L					—	—	—	X	M	
Bothrocara brunneum								—	—	—	X	M	
Lycodes concolor								—	—	—	X	M	

Life zone abbreviations:

F	Fluvial	IS	Inner Shelf
E	Estuarine	MS	Middle Shelf
N	Neritic	OS	Outer Shelf
EP	Epipelagic	MB	Mesobenthal
MP	Mesopelagic	BB	Bathybenthal
BP	Bathypelagic	AB	Abyssobenthal
I	Intertidal		

Symbols:

X and M	life zone classes that include about 95% of the occurrences of a species, with "M" designating the life zone of modal frequency of occurrence
—	occasional occurrence of the species in that life zone. In the neritic zone, this occurrence may be more than occasional, but was unmeasurable in this study
L and J	presence only as larvae or juveniles, respectively
?	uncertain

Table 8

Summary of zoogeographic and life zone classifications for common fish species in the Bering Sea and northeastern Pacific.

Species	Zoogeographic designation	Life zone designation	
		Depth range	Depth mode
Class Chondrichthyes			
Order Chimaeriformes			
Chimaeridae			
Hydrolagus colliei	Oregonian-Californian	Middle Shelf-Mesobenthal	Outer Shelf
Order Squaliformes			
Squalidae			
Squalus acanthias	Antitropical Temperate	Inner Shelf-Mesobenthal	Outer Shelf
Order Rajiformes			
Torpedinidae			
Torpedo californica	Oregonian-San Diegan	Middle Shelf-Mesobenthal	Outer Shelf
Rajidae			
Bathyraja interrupta	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
Raja binoculata	Eastern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
R. rhina	Eastern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
Class Osteichthyes			
Order Clupeiformes			
Clupeidae			
Alosa sapidissima	Amphiboreal American (WBA-NEBP)	Fluvial-Oceanic (EM)	Neritic
Clupea pallasii	Arctic-Circumboreal Pacific	Estuarine-Epipelagic	Neritic
Order Salmoniformes			
Bathylagidae			
Leuroglossus schmidti	Oceanic Subarctic Pacific	Mesopelagic	Mesopelagic
Osmeridae			
Mallotus villosus	Arctic-Amphiboreal (CBA-NBP)	Neritic-Epipelagic	Neritic
Osmerus mordax	Arctic-Amphiboreal (WBA-NBP)	Fluvial-Neritic	Neritic
Thaleichthys pacificus	Eastern Boreal Pacific	Fluvial-Oceanic (EM)	Neritic
Salmonidae			
Oncorhynchus tshawytscha	Arctic-Oceanic and NE Boreal Pacific	Fluvial-Oceanic (EM)	Neritic
Order Stomiiformes			
Chauliodontidae			
Chauliodus macouni	Oceanic Boreal Pacific	Mesopelagic	Mesopelagic
Order Gadiformes			
Macrouridae			
Albatrossia pectoralis	Northeastern Boreal Pacific	Mesobenthal-Bathybenthal	Bathybenthal
Coryphaenoides cinereus	Northeastern Boreal Pacific	Mesobenthal-Bathybenthal	Bathybenthal
Merlucciidae			
Merluccius productus	Oregonian-San Diegan	Neritic-Mesopelagic	Neritic

Table 8 (Continued)

Species	Zoogeographic designation	Life zone designation	
		Depth range	Depth mode
Class Osteichthyes (Continued)			
Order Gadiformes (Continued)			
Gadidae			
Boreogadus saida	Arctic	Neritic-Epipelagic	Neritic
Eleginus gracilis	Arctic-Northwestern Boreal Pacific	Inner Shelf	Inner Shelf
Gadus macrocephalus	Circumboreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
Microgadus proximus	Eastern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
Theragra chalcogramma	Arctic-Circumboreal Pacific	Neritic-Mesopelagic	Neritic
Moridae			
Antimora microlepis	Temperate North Pacific	Mesobenthal-Bathybenthal	Bathybenthal
Order Batrachoidiformes			
Batrachoididae			
Porichthys notatus	Oregonian-San Diegan	Intertidal-Mesobenthal	Outer Shelf
Order Scorpaeniformes			
Scorpaenidae			
Sebastes aleutianus	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Mesobenthal
S. alutus	Kurile-Aleutian	Outer Shelf-Mesobenthal	Outer Shelf
S. aurora	Oregonian-San Diegan	Outer Shelf-Mesobenthal	Mesobenthal
S. babcocki	Eastern Boreal Pacific	Outer Shelf-Mesobenthal	Mesobenthal
S. borealis	Eastern Boreal Pacific	Middle Shelf-Bathybenthal	Mesobenthal
S. brevispinis	Eastern Boreal Pacific	Outer Shelf-Mesobenthal	Outer Shelf
S. ciliatus	Aleutian	Outer Shelf-Mesobenthal	Outer Shelf
S. crameri	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
S. diploproa	Eastern Temperate Pacific	Outer Shelf-Mesobenthal	Mesobenthal
S. elongatus	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
S. entomelas	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
S. flavidus	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
S. goodei	Oregonian-San Diegan	Middle Shelf-Mesobenthal	Outer Shelf
S. helvomaculatus	Eastern Boreal Pacific	Outer Shelf-Mesobenthal	Mesobenthal
S. jordani	Oregonian-San Diegan	Middle Shelf-Mesobenthal	Outer Shelf
S. melanostomus	Oregonian-San Diegan	Mesobenthal-Bathybenthal	Mesobenthal
S. paucispinis	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
S. pinniger	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
S. polyspinis	Aleutian	Middle Shelf-Mesobenthal	Outer Shelf
S. proriger	Eastern Boreal Pacific	Outer Shelf-Mesobenthal	Outer Shelf
S. ruberrimus	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
S. rubrivinctus	Oregonian (M)-San Diegan	Inner Shelf-Mesobenthal	Mesobenthal
S. saxicola	Oregonian-San Diegan	Inner Shelf-Mesobenthal	Outer Shelf
S. variegatus	Aleutian	Inner Shelf-Mesobenthal	Outer Shelf
S. zacentrus	Eastern Boreal Pacific	Outer Shelf-Mesobenthal	Mesobenthal
Sebastolobus alascanus	Eastern Boreal Pacific	Outer Shelf-Bathybenthal	Mesobenthal
Anoplopomatidae			
Anoplopoma fimbria	Eastern Boreal Pacific	Inner Shelf-Bathybenthal	Outer Shelf
Hexagrammidae			
Hexagrammos stelleri	Arctic-Circumboreal Pacific	Inner Shelf-Middle Shelf	Inner Shelf
Ophiodon elongatus	Eastern Boreal Pacific	Estuarine-Mesobenthal	Outer Shelf
Pleurogrammus monopterygius	Northwestern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
Cyclopteridae			
Aptocyclus ventricosus	Kurile-Aleutian	Neritic-Mesopelagic	Neritic
Eumicrotremus orbis	Arctic-Northern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
Liparis gibbus	Arctic-Western Boreal Atlantic	Inner Shelf-Outer Shelf	Middle Shelf
Psychrolutidae			
Dasycottus setiger	Northern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
Malacocottus kincaidi	Kurile-Aleutian	Outer Shelf-Bathybenthal	Mesobenthal
M. zonurus	Northern Boreal Pacific	Outer Shelf-Bathybenthal	Mesobenthal
Agonidae			
Aspidophoroides bartoni	Arctic-Northern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
Bathyagonus nigripinnis	Eastern Boreal Pacific	Middle Shelf-Bathybenthal	Mesobenthal
Occella dodecaedron	Arctic-Okhotsk	Inner Shelf-Middle Shelf	Inner Shelf
O. verrucosa	Eastern Boreal Pacific	Inner Shelf-Outer Shelf	Inner Shelf
Podothecus acipenserinus	Arctic-Eastern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
Sarritor frenatus	Northern Boreal Pacific	Middle Shelf-Bathybenthal	Outer Shelf
Hemitripteridae			
Hemitripterus bolini	Aleutian	Middle Shelf-Mesobenthal	Outer Shelf
Cottidae			
Enophrys diceraus	Arctic-Northern Boreal Pacific	Inner Shelf-Middle Shelf	Inner Shelf
Gymnocanthus galeatus	Kurile-Aleutian	Inner Shelf-Outer Shelf	Middle Shelf
G. pistilliger	Northern Boreal Pacific	Inner Shelf-Middle Shelf	Inner Shelf
G. tricuspis	Arctic-Circumboreal Atlantic	Inner Shelf-Outer Shelf	Inner Shelf
Hemilepidotus hemilepidotus	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Middle Shelf

Table 8 (Continued)

Species	Zoogeographic designation	Life zone designation	
		Depth range	Depth mode
Class Osteichthyes (Continued)			
Order Scorpaeniformes (Continued)			
Cottidae (Continued)			
Hemilepidotus jordani	Kurile-Aleutian	Inner Shelf-Mesobenthal	Outer Shelf
H. papilio	Arctic-Okhotsk	Inner Shelf-Outer Shelf	Middle Shelf
Icelinus filamentosus	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
Icelus canaliculatus	Northern Boreal Pacific	Mesobenthal-Bathybenthal	Bathybenthal
I. spiniger	Northern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
Myoxocephalus jaok	Arctic-Northern Boreal Pacific	Inner Shelf-Outer Shelf	Inner Shelf
M. polyacanthocephalus	Kurile-Aleutian	Inner Shelf-Mesobenthal	Middle Shelf
M. verrucosus	Arctic-Aleutian	Inner Shelf-Outer Shelf	Middle Shelf
Triglops forficata	Aleutian	Inner Shelf-Outer Shelf	Outer Shelf
T. macellus	Aleutian	Inner Shelf-Outer Shelf	Middle Shelf
T. pingeli	Arctic-Amphiboreal (WBA-NBP)	Inner Shelf-Outer Shelf	Middle Shelf
T. scepticus	Northern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
Order Perciformes			
Embiotocidae			
Zalembius rosaceus	Oregonian (M)-Californian	Middle Shelf-Outer Shelf	Middle Shelf
Bathymasteridae			
Bathymaster signatus	Arctic-Aleutian	Middle-Shelf-Mesobenthal	Outer Shelf
Ronquilus jordani	Eastern Boreal Pacific	Inner Shelf-Outer Shelf	Outer Shelf
Zoarcidae			
Bothrocara brunneum	Northeastern Boreal Pacific	Mesobenthal-Bathybenthal	Bathybenthal
Lycodes brevipes	Northeastern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
L. concolor	Northern Boreal Pacific	Mesobenthal-Bathybenthal	Bathybenthal
L. cortezianus	Eastern Boreal Pacific	Outer Shelf-Mesobenthal	Mesobenthal
L. diapterus	Northeastern Boreal Pacific	Outer Shelf-Bathybenthal	Mesobenthal
L. palearis	Arctic-Circumboreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
L. raridens	Arctic-Okhotsk	Inner Shelf-Outer Shelf	Middle Shelf
L. turneri	Arctic-Western Boreal Atlantic	Inner Shelf-Middle Shelf	Inner Shelf
Stichaeidae			
Lumpenella longirostris	Northern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
Lumpenus fabricii	Arctic-Northern Boreal Pacific	Inner Shelf-Middle Shelf	Inner Shelf
L. maculatus	Arctic-Amphiboreal (CBA-NBP)	Inner Shelf-Outer Shelf	Middle Shelf
L. sagitta	Kurile-Aleutian	Inner Shelf-Outer Shelf	Middle Shelf
Zaproridae			
Zaprora silenus	Northeastern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
Trichodontidae			
Trichodon trichodon	Eastern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
Ammodytidae			
Ammodytes hexapterus	Arctic-Northeastern Boreal Pacific	Inner Shelf-Middle Shelf	Inner Shelf
Order Pleuronectiformes			
Paralichthyidae			
Citharichthys sordidus	Oregonian-San Diegan	Inner Shelf-Outer Shelf	Middle Shelf
Pleuronectidae			
Atheresthes evermanni	Northern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
A. stomias	Eastern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
Eopsetta exilis	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
E. jordani	Eastern Boreal Pacific	Inner Shelf-Mesobenthal	Outer Shelf
Errex zachirus	Eastern Boreal Pacific	Middle Shelf-Mesobenthal	Outer Shelf
Hippoglossoides elassodon	Kurile-Aleutian	Inner Shelf-Mesobenthal	Outer Shelf
H. robustus	Arctic-Okhotsk	Inner Shelf-Outer Shelf	Middle Shelf
Hippoglossus stenolepis	Arctic-Northeastern Boreal Pacific	Inner Shelf-Mesobenthal	Middle Shelf
Microstomus pacificus	Eastern Boreal Pacific-San Diegan	Inner Shelf-Mesobenthal	Outer Shelf
Platichthys stellatus	Arctic-Circumboreal Pacific	Estuarine-Outer Shelf	Inner Shelf
Pleuronectes asper	Arctic-Northwestern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
P. bilineatus	Northeastern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
P. isolepis	Eastern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
P. proboscideus	Arctic-Okhotsk	Inner Shelf-Middle Shelf	Inner Shelf
P. quadrituberculatus	Arctic-Northern Boreal Pacific	Inner Shelf-Outer Shelf	Middle Shelf
P. vetulus	Eastern Boreal Pacific-San Diegan	Inner Shelf-Mesobenthal	Middle Shelf
Psettichthys melanostictus	Eastern Boreal Pacific	Inner Shelf-Outer Shelf	Inner Shelf
Reinhardtius hippoglossoides	Arctic-Amphiboreal (CBA-NBP)	Inner Shelf-Bathybenthal	Middle Shelf

Abbreviations:

CBA Circumboreal Atlantic
NBP Northern Boreal Pacific
NEBP Northeastern Boreal Pacific
WBA Western Boreal Atlantic
M Montereyan Subprovince of Oregonian Province

DISCUSSION

Although the species examined in this study were unequally distributed among zoogeographic range types, life zones, and depth zones, this distribution pattern is largely the result of the distribution of sampling effort. Because the greatest sampling effort was in the eastern boreal Pacific, the greatest number of species examined were eastern boreal Pacific species. The Arctic region was sampled more frequently than the warm temperate regions south of Point Conception, California, and this is reflected in the greater number of species with Arctic rather than temperate distributions. Further, because demersal trawls were the major sampling device used, most species had benthic affinities. As noted above, the percentage of total species with centers of distribution in a given depth zone roughly corresponded to the percentage of total samples in that depth zone. Thus, care should be taken in using the summary of distribution patterns as a description of general zoogeographic or life zone patterns found among species in the area.

In addition to sampling bias, this study is also biased in terms of the species chosen for examination. Only frequently occurring species (i.e., occurring in 100 or more samples) were examined. Hence, wide-ranging species were generally selected and species with limited ranges were seldom included. Zoogeographic provinces, however, are defined largely on the distribution of short-range species. Briggs (1974) defined provinces based on 10% or more endemism for a region; in other words, regions where 10% or more of the species had similar limited ranges. These endemic species were largely from invertebrate rather than fish taxa. Because the major emphasis of the present study is to show the distribution patterns of the most common fish species found in the database (and, hence, demersally along the west coast of boreal North America), our analyses of wide-ranging species are appropriate. However, the database also has information on limited-range species (although some of these are merely widely-distributed species that were ineffectively sampled by the methods used). Further studies on the west coast fauna should examine distributional information on these species found in the database.

In addition, although the classification of the distribution patterns of limited-range species is simple (if their range corresponds to that of a province), the classification of long-range species is not so easy. There is no terminology that is consistently used in the literature. Andriyashev (1939) classified many Bering Sea species by range, but included a subarctic region in many names. Briggs (1974), however, did not define a subarctic region for any region in the world, limiting the names of the regions at subarctic latitudes to Arctic or cold temperate (boreal). Hedgpeth (1957b) defined an Arctic region for the Sea of Okhotsk and part of the western Bering Sea. In the present study, seven species show distribution patterns that include both the Sea of Okhotsk and the colder portions of the Bering Sea shelf north to the Chukchi Sea. These species were classified as Arctic-northern boreal Pacific (Okhotsk), using provinces defined in Briggs (1974). However, this pattern may best represent a subarctic Pacific region. Both the Sea of Okhotsk and the eastern Bering Sea are covered with ice during a large part of the year, but are ice-free for the rest of the year. The species with this pattern do not extend far into the Arctic nor do they occur very far into other northern boreal provinces. If the 10% endemism rule is used to define provinces, more Sea of Okhotsk species should be examined for this distribution pattern. It may well be that the Okhotsk province of Briggs (1974) should include the northern shelf of the eastern Bering Sea and should be termed Subarctic Pacific rather than Okhotsk.

Briggs (1974) noted that the distribution patterns of organisms in the Bering Sea were not well known and defined the Arctic region as extending south to Nunivak Island and Cape Olyutorski (based largely on the southerly extent of sea ice during the winter). Andriyashev (1939) analyzed the species of the Bering Sea quite thoroughly with respect to their zoogeographical relationships and showed that this region was an overlap zone (or ecotone) for at least three zoogeographic provinces. These include (in the terminology of Briggs, 1974) the Arctic, eastern boreal Pacific, and western boreal Pacific regions. The region of overlap between the western boreal Pacific and Arctic regions in the northern Bering Sea was considered to be a subarctic region. The map of the distribution of these provinces in the Bering Sea shown in Andriyashev (1939) is essentially correct (based on an examination of the ranges of species in the present study). It includes a tongue of the Aleutian Province along the slope of the Bering Sea to Navarin Canyon. However, based on information in the present study, subarctic and Arctic species appear to extend further southeast along the middle shelf zone. This region corresponds to a cold-water hydrographic domain noted by Kinder and Schumacher (1981) and others.

Because the present study does not include all species of the fauna, we will not attempt to examine province boundaries. However, it is apparent that many species in the eastern Bering Sea (with primarily western boreal or Arctic affinities) extend east to about Kodiak Island. Many species that were once thought to reach southeast Alaska were later found (in the literature) farther south to Vancouver Island or Puget Sound, and other species that were thought to extend north to southeastern Alaska have now been found (in maps in this study) as far west as Kodiak Island or the Alaska Peninsula. Peden and Wilson (1976) noted that the boundary between the Aleutian and Oregonian Provinces apparently does not occur at Dixon Entrance (as suggested by Briggs 1974). Preliminary analyses of the relative abundance of some geographically-displacing species (based on data at the Northwest and Alaska Fisheries Center) suggest that the boundary between these provinces occurs off northern Vancouver Island. Further study on the distribution of fishes in the Gulf of Alaska is needed (particularly between southeast Alaska and Puget Sound) to resolve this problem.

Only two species, the flag rockfish, *Sebastes rubrivinctus*, and pink seaperch, *Zalembius rosaceus*, appeared, at least partially, to confirm the presence of a Montereyan Subprovince of the Oregonian Province, as defined by Hubbs (1974). More extensive sampling in the south may have increased the frequency of occurrence of species with this distribution pattern in the database. It does appear, however, that Cape Mendocino, California, is an important southern limit (at least in abundance) of many northern species.

Although there were many range extensions from the database, few species taken at the range edges were ever collected and deposited in fish collections. Hence, each extension is somewhat uncertain and we have tried to identify those that are less reasonable from those that are probably real extensions. It is hoped that in the future, specimens will be collected from the edges of the ranges of each species for deposition in an established fish collection. This is particularly important for those species which may have been confused with other species in the field.

The domination of the survey by wide-ranging species is also apparent in the classification of species by life zone. Sublittoral-bathyal species were most numerous, but most of these extended from the inner or middle shelf to the mesobenthal slope. The dominance of sublittoral (inner shelf-outer shelf) species when specific life zone spans are considered confirms the validity of a distinct shelf fauna. The paucity of samples in inshore, bathybenthal, neritic, and oceanic

areas does not allow for an adequate evaluation of these zones. Although species with distributions limited to inshore areas occur in this survey, species restricted to the mesobenthal environment did not occur.

This study differs from that of Fedorov (1973a), which classified Bering Sea fishes by life zone, in that species were categorized by the range of life zones which contain 95% of the occurrences rather than by a more subjective placement of species into single life zones. That study, however, gave a more complete description of the species found in a life zone because all species found in the Bering Sea were considered. Allen (1982) defined possible life zone boundaries on the southern California shelf by noting depths at which a high percentage of foraging guilds of fishes showed shifts in species dominance. Thus, of 18 guilds of soft-bottom fishes, the dominant species of a guild shifted from one species to another in 50% of the guilds at 80 m, in 44% at 170 m, and in 39% at 20 m. This study emphasized using the shifts in relative abundance of ecologically-similar species for defining faunal boundaries rather than just considering the frequency distribution with regard to depth of single species.

Additional work needs to be done to define faunal boundaries between zoogeographic provinces or life zones. Because the abundance of a species often decreases almost asymptotically near the edges of the range, the endpoints of a species range often occur far outside its area of abundance. Hence, faunal studies should be concerned with defining the ranges of species in terms of areas of abundance rather than of total range. Until recently, however, summarization of the within-range distribution of species has been difficult and time consuming. If occurrence patterns are known, then the distribution can be described in terms of the area containing 95% (or some other percentage) of the occurrences. Faunal regions can then be described as areas containing the common occurrence of large numbers of limited-range species. When assigning species to zoogeographic and life zone patterns, it is preferable to use the region of common occurrence rather than that of modal occurrence. The former accounts for the importance of wide-ranging species in more than one faunal category, while this is obviously obscured in the latter. In addition to using the distribution patterns of individual species removed from the context of their communities, a description of the distribution patterns of species (particularly of ecological counterparts) in large-scale communities or assemblages might prove to be valuable for determining faunal boundaries and for assigning species to faunal categories.

Although the intent of this paper was to make use of a large set of data on the distribution of Bering Sea and northeastern Pacific fishes and of computer summarization and mapping techniques to better describe the zoogeographic patterns of fishes, it falls short of this goal in several ways. Because the entire range of many species was not included in the database, much of the zoogeographic speculation is based on literature records. This study, however, does provide a better description of the distribution patterns of species in the Bering Sea, the only area with a sufficiently broad shelf to detail within-shelf distribution patterns of species at the geographic scale of consideration. Because the frequency of occurrence of species within their geographic ranges has not been adequately described, regions of common occurrence still remain to be described. In addition, because of the focus on common species rather than on the entire fauna, the location of previously described faunal boundaries cannot be adequately evaluated. The description of the distribution with regard to depth helps to better define the depth range of species, but the frequency distributions were based on the percentage of the total occurrences of a species within a depth interval rather than the percentage of total samples within a depth interval. Both approaches are affected by total sampling effort but the latter is likely to give misrepresentative modes in intervals with low sampling effort. Because the entire fauna was not included, no attempt was made to better define life zone boundaries. In spite of these problems it is hoped that the study provides useful information on the distribution of common fish species in the region and will stimulate further investigations to better describe the faunal patterns of Bering Sea and northeastern Pacific fishes.

CONCLUSIONS

1. Of 121 species of fishes commonly taken by demersal trawls in the Bering Sea and northeastern Pacific, most were boreal species; eastern boreal Pacific species were most numerous, followed by northern boreal Pacific and Kurile-Aleutian species.
2. Most species examined were sublittoral-bathyal in life zone distribution, followed by sublittoral and bathyal species; however, with regard to more specific life zone designations, sublittoral (inner shelf-outer shelf) species were most numerous followed by middle shelf-mesobenthal and inner shelf-mesobenthal species.
3. Most families included species that differed in distribution (combined zoogeographic and life zone) patterns; the greatest number (7) of species with similar distribution patterns occurred among rockfishes (Scorpaenidae).
4. The survey data from 24,881 trawl and fish trap samples collected during a 30-year period extended the known range of 111 commonly occurring species; most of the geographic range extensions were to the north or in the Aleutian Islands, whereas most depth range extensions were of maximum depth.
5. Faunal patterns on the Bering Sea shelf depart from the typical bathymetric pattern of narrow shelf regions because of unusual thermal patterns found in that area.

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